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APPLICABILITY OF NATIONAL DATA BUOY SYSTEMS TO REFINED NATIONAL REQUIREMENTS FOR MARINE METEOROLOGICAL AND OCEANOGRAPHIC DATA

Volume II: APPENDIXES

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by

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Project Scientist

and

Gaylord M. Northrop

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October 1968

TRC Report 7493-332b
Prepared for the U.S. Coast Guard
Under Contract No. DOT-CG-82504-A

E. J. Aubert
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Principal Investigators

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Views or conclusions contained in this study report should not be interpreted as official opinion or policy of the Federal Government.

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FOREWORD

Contract Number DOT-CG-82504-A between the U. S. Coast Guard and The Travelers Research Center, Inc. (TRC) consists of five parallel activities. The five final reports stemming from these activities are entitled:

(1) Applicability of National Data Buoy Systems to Refined National Requirements for Marine Meteorological and Oceanographic Data (two volumes).

(2) Characteristics of National Data Buoy Systems: Their Impact on Data Use and Measurement of Natural Phenomena

(3) Cost Effectiveness Sensitivity of National Data Buoy Systems: An Essay

(4) Computer Programs for National Data Buoy Systems Simulation and Cost Models

(5) An Analysis of Cruise Strategies and Costs for Deployment of National Data Buoy Systems

Each of these five reports is complete in itself, but it must be recognized that in all instances the other four activities both influenced and contributed to the results presented in each individual report.

The present USCG/TRG contract is an outgrowth of a study of the feasibility of national data buoy systems performed by TRC and Allie Geophysical Associates for the USCG during 1967. Need was evident for investigation, research, and analysis in greater depth in several areas to support the concept formulation and deployment planning efforts of the newly-formed U. S. Coast Guard National Data Buoy System Designated Project Office (NDBS DPO). This report and the other four cited above satisfy some of those needs.

All five TRC reports have benefited from the close cooperation and guidance afforded by the USCG NDBS DPO. Contributions have been made by Capt. J. Hodgman (Project Manager), Cmdr. V. Rinehart, J. Wesler, E. Parker, and P. Morrill, and Lt. Cmdr. W. Merlin (Contract Monitor).

The authors wish to acknowledge the technical support and contributions provided by Paul R. MacDonald and Paul V. Luty of the TRC Technical Staff.

SUMMARY, VOLUME I

This report documents the 1968 refinement of national requirements for marine meteorological and oceanographic data -- initially compiled during the 1967 Study of the Feasibility of National Data Buoy Systems (NDBS)--and shows the applicability of certain postulated NDBS sensing characteristics to a subset of the refined data requirements. National data requirements to support operational and research activities are presented; they include physical, biological, chemical, geological, and radiological parameters which are to be measured throughout the world's oceans from the ocean bottom to 100,000 feet in the atmosphere. The data requirements are projected from the present to as far as 15 years into the future. The applicability of possible future National Data Buoy Systems (NDBS) to 1968 refined national data requirements is illustrated by the use, for reference purposes only, of the potential sensing capabilities (parameters and measurement characteristics) of a hypothetical data buoy "system".

The comprehensiveness and accuracy of the 1967 statements of data requirements were constrained by a lack of requirements collection precedence and by the usual difficulties encountered in collecting environmental data requirements from a wide variety of government agencies. The 1967 data requirements were collected without benefit of complete standardization or reference to the sensing characteristics shown to be economically and technically feasible in the 1967 TRC study. The U.S. Coast Guard was assigned development responsibility for the NDBS in November 1967. The USCG National Data Buoy Systems Designated Project Office (NDBS DPO) established a data requirements refinement effort as one activity of Contract DOT-CG-82504-A, to obtain more up-to-date, accurate, complete, and clearly-defined statements of data requirements, suitable for the initial phases of system development planning. Standardization of terms and units was sought and refinement of data requirements in the Deep Ocean (DO)* and Coastal North American (CNA)** regions were solicited from the U.S. Government agencies that had provided data requirements for the 1967 feasibility study. Throughout this work, operational data requirements have been emphasized somewhat more than research requirements because of their more stable, long-term nature and because of the potential benefits that might be realized by

*Beyond 400 n mi of North American Coast.

**Within 400 n mi of North American Coast.

implementation of an NDBS capable of satisfying operational requirements at the earliest possible time.

The 1968 data requirements refinement and the analysis of the applicability of hypothetical NDBS sensing characteristics were conducted in several phases. First, from the results of review of 1) the 1967 statements of data requirements, 2) the 1967 projected estimates of 5-year buoy state-of-the-art (SOA), and 3) the results of the 1967 feasibility study, a hypothetical data-buoy "system" was conceptualized for reference purposes (with a few important exceptions, this "strawman system" was comparable to those postulated in the 1967 feasibility study). Second, an assessment was made of how well each set of the 1967 data requirements would be met by this hypothetical "system." Third, the results of this assessment, together with questions that arose during the analysis and assessment, were forwarded to the pertinent agencies for refinement action. Fourth, responses (including answers to specific questions submitted to the agencies) were analyzed, assessed, and translated into tentative NDBS sensing characteristics needed to meet data requirements in various marine regions. Finally, the refined data requirements were interpreted in terms of tentative observation sites in hypothetical DO and CNA "system" networks in 13 geographical regions called Modular Deployment Zones (MDZ).

After receiving the TRC review and assessment of their 1967 statements of data requirements, the agencies made refinements to their data requirements in light of the potential sensing characteristics of the hypothetical technologically feasible NDBS. When the refined data requirements were returned to TRC they were again assessed and tallied in the following manner: Total operational data requirements for observations of data at sites were sorted by agency-mission-operations (AMO), by agency, by DO and CNA regions, and by 13 geographical regions called Modular Deployment Zones (MDZ). In each sort, where applicable, the distribution of requirements to collect data at observation sites was established and the redundancy or common use of observation sites, where possible, was analyzed to reduce the number of required sites. For example, various operations within an agency (or among agencies) might have requirements for data (the same or different parameters) from the same type of observational network in a given geographical area. The total number of requirements for observations would thus be larger than the number of sites required to meet them.

The required observation sites were then related to those that conformed to the network sites of the reference "system." Required observation sites were then classified as "system" or non-"system." A similar analysis of the numerical distribution of specific parameter requirements was performed for "system" and non-"system" sites within each MDZ. For each of the 13 MDZs, the total number of operational requirements for data collection at each "system" site and corresponding total requirements for specific parameters have been established, thus demonstrating the degree of utility for each "system" observation site. The complete analysis also covers non-"system" sites in the same manner and illustrates the low operational utility of these sites. A similar, but less extensive, analysis was made of research requirements that were either met or partially met by the hypothetical reference "system".

Finally, all operational requirements and selected research requirements (those research requirements for which the hypothetical "system" had considerable applicability) were combined into national data requirements and assessed for numerical distribution of requirements for observations at sites that could be assumed to be those of the hypothetical reference "system." This indicates the degree of potential utility of the hypothetical reference "system" for satisfying combined national requirements.

In total, there are 1,898 DO and 1,353 CNA requirements for data collection at sites for combined national interests that could be met by hypothetical "system" observation sites. When the potential reduction of observation sites made possible through the common use of a site is taken into account, the net number of required hypothetical "system" observation sites is 261 for the DO region and 279 for the CNA region. Thus, a 7:1 average ratio of combined requirements-for-data-collection-at-observation-sites to "system" observation sites is achieved in the Deep Ocean MDZs, and approximately a 5:1 average ratio of requirements to "system" sites is established in the Coastal North American MDZs.

Of course, these findings are based upon the assumption that the 1968 statements of refined data requirements are the best presently available and collectively represent the national interests. About mid-1968, estimates of the relative values of parameters and observing layers were solicited from four agencies with operational missions. The agency responses indicated that additional information, related to data requirements

and useful for NDBS development planning, can be obtained. This initial effort has made clear that further work of this kind should be undertaken in the future.

The ultimate sensing characteristics of various National Data Buoy Systems have not yet been finalized. The statements of data requirements presented in this report provide a base for assessment of hypothetical, technically feasible sensing characteristics,* thus adding another dimension to preliminary system development planning. Among other important features of evolving NDBS system development planning that will doubtless influence the NDBS sensing characteristics ultimately implemented are cost-effectiveness studies, trade-offs of potential development vs off-the-shelf equipment acquisition, relative values of data from contiguous geographical regions, research, economic, social, and military benefits, and national and international relative worth of the NDBS (or, the data collected by the NDBS). Within this context, the conclusions of this study are as follows.

- The continuing evolutionary nature of requirements for marine environmental data must be recognized. It is the result of numerous factors. Annual review and refinement of requirements will probably be necessary throughout the foreseeable future.

- Agency representatives have demonstrated a willingness and ability to estimate the relative importance of parameters and observing layers as part of the continued refinement of data requirements. A more intensive program to develop and exploit quantified ratings of this type should be undertaken.

- Horizontal spacings for Deep Ocean buoy networks of 600 n mi and Coastal North American network spacings of 100 to 150 n mi appear to be generally acceptable for an initial NDBS and appear to serve the stated needs of many activities. A total of 261 DO and 279 CNA data buoys would be needed to satisfy these horizontal spacing requirements in the ocean areas.

- Twenty parameters in the following table and their measurement characteristics (see Appendix IV) are suggested as representative of the basic sensing characteristics of a future DO or CNA NDBS. They are the result of the assessment of refined 1968 data requirements and appear to be generally

*Technically feasible sensing characteristics are defined as those estimated to be achievable within 5 years by conventional development effort.

acceptable to the involved U.S. Government agencies at this time. Inclusion of additional parameters of high common need or importance in specific geographic regions appears indicated. Development of new sensing capabilities for some of the additional parameters (e.g., upper air parameters) appears worthy of further consideration.

TABLE OF BASIC PARAMETERS SUGGESTED TO BE REPRESENTATIVE OF POSSIBLE FUTURE NDBS SENSING CHARACTERISTICS

Meteorological

- Air temperature
- Atmospheric electricity
- Atmospheric pressure
- Dew point
- Insolation
- Precipitation rate
- Wind direction
- Wind speed

Oceanographic

- Ambient light
- Ambient noise
- Current direction
- Current speed
- Salinity
- Sound speed
- Transparency
- Water pressure (depth)
- Water temperature
- Wave and swell:
  - Direction
  - Height
  - Period

In preparing this report, it has been the intent of the authors to document as clearly as possible the steps involved in the collection and assessment of data requirements, and the analysis leading to further delineation of the basic sensing characteristics of future National Data Buoy Systems. There is much yet to be learned about the marine environment; data requirements will likely change in the future in an evolutionary fashion. The NDBS will be but one data collection system operating ultimately within the context of a total national marine environmental data collection system. Thus, this report may be of use or guidance, not only in support of NDBS development planning, but also to agencies having requirements now or in the future for data from the marine environment and agencies having present or future responsibilities for developing and or operating the other data collection systems that will comprise the rest of the national marine environmental data collection system.

Therefore, this report has, to the extent possible, been structured to keep this larger task in view, while at the same time concentrating on details most relevant to NDBS development.

Many of the results and conclusions discussed in this report are based on interpretations by the authors of data requirements collected from U.S. Government Agencies. Often, interpretations were made in areas that are recognized to be controversial. The cooperating agencies are encouraged to "set the record straight" on any point where these interpretations may not have hit the mark. Ultimately, it is hoped that through interactive efforts, such as described in this report, procedures that are both useful and acceptable to all concerned will evolve and the major task of developing an effective national marine environmental data collection system will be accomplished.

SUMMARY, VOLUME II

Volume II of the report, The Applicability of National Data Buoy Systems to Refined National Requirements for Marine Meteorological and Oceanographic Data, contains the five Appendixes for Volume I, the basic report, as listed in the Table of Contents.

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APPENDIX I

SUPPORTING DOCUMENTATION

APPENDIX I, PART A. REASONS FOR NON-INCLUSION OF PARAMETERS IN THE TENTATIVELY PROPOSED NDBS SENSING CHARACTERISTICS

In the 1967 compilation of 113 marine meteorological and oceanographic parameter requirements, there were 72 parameters that were considered to be measurable from unmanned buoys. After elimination of redundancy (similarity of parameters) and the computed or derived parameters, this list of 72 was collapsed to the 43 primary (observed) parameters identified in Table 2-2. Of these 43, there were 19* parameters that met the criteria for inclusion in the tentatively proposed NDBS sensing capabilities (see Table 2-5). The remaining 24 parameters are listed alphabetically on the left side of Table I-1 with an indication by (0) and (R) whether they were required for support of activities that were operational, research, or both. On the right side of the table, the reasons are given why these parameters were not included in the initial tentatively proposed NDBS sensing characteristics.

*For the purposes of this report, Sound Speed, the 20th parameter, is considered to be derived from primary (observed) parameters.

TABLE I-1
REASONS FOR NON-INCLUSION OF PARAMETERS IN TENTATIVE NDBS

Parameter	Reason
1. Albedo (R)*	There is a potential instrumentation problem, probably requiring a stabilized boom hanging out over the water surface to obtain a meaningful pyroheliometer measurement. It must continually look down on the water surface (like the Total Radiation Out instrument) and not at other sources, such as the horizon or sky.
2. Bathymetry (0*, R)	Not a rapidly changing parameter that needs several observations a day. Better done by other means (e.g. a ship) to get greater coverage along lines etc. on a not-too-frequent basis.

*(R) = Research, (0) = Operational.

TABLE I-1
REASONS FOR NON-INCLUSION OF PARAMETERS IN TENTATIVE NDBS (Continued)

Parameter	Reason
3. Biological Growth (R)	Requested only by Duke University for two points in the western Atlantic. The requirement is for a two-month duration of observation; other details are lacking.
4. Bottom Photography (0)	Requested only by N00 Code 90 ocean surveys; there is a complete lack of detail. Considered best done by a ship or deep submersible since this is a single observation made occasionally, say once a year.
5. Carbon Dioxide (R)	Requested only by Duke University for two points in the western N. Atlantic; also, there is a potential reliability problem when long unattended.
6. Gravity (0)	Requested only by N00 Code 90 Ocean Surveys, it is a one-site-at-a-time requirement for a single reading. Considered best done by a ship or submersible.
7. Ice Accumulation (R)	Requested only by the Bureau of Mines; most of the details of the requirements are unknown or not stated. Could be developed from airborne equipment and adapted for buoys.
8. Inclination (R)	Requested only by USN-Underwater Sound Lab. for less than 10 points in test ranges. This is for inclination of the mooring line at the sensor package. They have their own special equipment for this.
9. Magnetic Field (0, R) Declination D	Requested only by ESSA C + GS; it requires a highly stable platform.
10. Magnetic Field (0, R) Inclination I	Requested only by ESSA C + GS and requires a highly stable platform.
11. Magnetic Field Intensity F (0, R)	Requested by three agencies. ESSA C + GS wants both intensity and direction. This requires a highly stable platform. The USN Marine Engineering wants data from one

TABLE I-1

REASONS FOR NON-INCLUSION OF PARAMETERS IN TENTATIVE NDBS (Continued)

Parameter	Reason
11. Magnetic Field Intensity F (0, R) (Continued)	isolated area near the U.S. coast. N00 Code 90 has a one-site-at-a-time requirement for a single reading about once a year. Latter two requirements considered best met by ship or submersible.
12. Oxygen (0, R)	There is a potential instrumentation problem: that of developing sufficient reliability and stability for a year of unattended, remote operation.
13. pH (R)	Requested only by USN Marine Engineering Lab. for bottom measurement only and one point at a time along the east coast and in the Caribbean Sea. Another case of potential instrumentation problem of sufficient reliability and stability for a year of unattended operation.
14. Propagation Loss (0)	Requested only by N00 Code 90 Ocean Surveys; the details of requirements for spacing between source and receipt were not given. Better done by ocean survey ship, possibly in conjunction with a special buoy or more likely another ship some distance away.
15. Radiological Chemicals (0)	Requested only by FWPCA for estuaries and near shore. Details of requirements are vague.
16. Sediment Deposit (0, R)	Requested by three AMOs. Area wanted by USCG is polar region; outside area planned for system. N00 Code 90 requires two points only and details are lacking. The requirements by the University of Washington is for sediment load and details of measurement characteristics were unknown. This is a slowly varying parameter probably better done by other means.

TABLE I-1

REASONS FOR NON-INCLUSION OF PARAMETERS IN TENTATIVE NDBS (Continued)

Parameter	Reason
17. Tidal Fluctuation (0, R)	No instrumentation problem out to 100 feet depth. At greater depths there is a question whether the accuracy requirement (for absolute values) could be met by pressure gauge method due to both long and short term drift of instrument. This bottom observational instrument is steadily being improved. Requires continuing revaluation.
18. Total Cloud Amount (0, R)	This parameter was judged better measured by weather satellite.
19. Total Radiation In (R)	This parameter is assumed to be the same as insolation, because of the way the requirements were stated.
20. Total Radiation Out (R)	There is a potential instrumentation problem. It may take a special boom hanging out over the water surface to obtain a meaningful measurement. This instrument must continually look down at the water surface and not at other sources such as the horizon or sky.
21. Turbidity (R)	Requested by USN Mine Defense Laboratory for small area near Panama City out to 600 feet depths. Also requested by USN Marine Engineering Laboratory for a bottom measurement only and one point at a time along the east coast and in the Caribbean Sea. Expect measurement of transparency to be equivalent.
22. Vertical Current (R)	There is a potential instrument reliability problem due to long unattended periods of operation.
23. Visibility (0) (in surface layer)	There is a potential instrumentation problem. The instrument measures integrated backscatter from a controlled light source over a range of about 100 meters. This gives a measure of visibility sampled around the buoy with some indication of greater distances.

TABLE I-1

REASONS FOR NON-INCLUSION OF PARAMETERS IN TENTATIVE NDBS (Continued)

Parameter	Reason
23. Visibility (0) (in surface layer) (Continued)	From a conservative viewpoint, this is not exactly how visibility is generally measured.
24. Water Level (R)	Special for Great Lakes only. Involves reference of water levels to a standard marker on the land. Usually measured by fixed instrument like tide guage.

APPENDIX I, PART B. AN EXAMPLE OF AN ASSESSMENT SHEET FOR THE 1967 DATA REQUIREMENTS

Assessment of Agency-Mission-Operation (AMO) Data Requirements

The attached two tables present in brief form an assessment of an agency-mission-operation requirement for oceanographic and marine meteorological data. The basis for the comparison and assessment is the parameter-measuring cabilities and characteristics of the tentative operational National Data Buoy "System" estimated in the course of the 1967 study of the Feasibility of National Data Buoy Systems.

In the first table, the given tentative data buoy system capabilities and characteristics are a product of common, operational requirements derived from Federal Agencies' requirements solicited in early 1967, and from estimates of the five-year state-of-the-art for buoys, sensors, and other system elements.

The development of National Data Buoy Systems by the USCG Project Management Office must be based on valid evolutionary [illegible]rements for oceanographic and marine meteorological data, both for operational and research use. The purpose of this assessment and its review by agencies is directed, first, to ensuring that all stated data requirements take cognizance of the anticipated potential of the tentative operational data buoy system and, second, to ensuring that capabilities are provided where feasible to meet all other justifiable requirements.

The first of the two attached assessment sheets presents at the top the tentative data buoy system capabilities and characteristics for the 20 parameters to be measured to satisfy common, operational data requirements. In the center of the page are the agency's data requirements comparable to the tentative "system" capabilities. At the bottom of the page is an assessment of all AMO data requirements, in terms of "requirements fully met," "Requirements partially met and why," and "requirements not met and why." The second page presents characteristics of all data requirements not met by the tenatively proposed "system." Parameters listed at the top of this page might be met - at least partially - provided certain problem areas can be resolved. Agency assistance is requested to establish where possible an acceptable approach for the development of a sensing capability for measuring these parameters. Parameters listed at the bottom of the second sheet are presently considered to be beyond the

five-year state-of-the-art for a buoy system operating unattended for at least one year. Agency concurrence, or non-concurrence and further assistance as noted above, is requested in conjunction with this assessment.

ASSESSMENT SHEET FOR 1967 DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NOBS SENSING CHARACTERISTICS

15 Feb 68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press. (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir.	Air temp	Atmos. elect.	Atmos. press.	Dew point	Insolation	Precip. rate	Wind dir	Wind speed
Geographic location		Deep Ocean/N. American Coast out to 400 n. mi.																			
Vertical layer		Sfc. to 5000 m depth									Sfc										
Range (5 yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5000 fps	-5 to 40°C	0 to 10⁶ psi	0 to 2.0 ly/m	-60 to -20 db	0 to 70%/m	0 to 100 ft	2 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1000 mb	25 to 40°C	0.1 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 100 kt
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	1 db	2%	0.3 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling intensity	X, Y	< 500 n. mi/< 160 n. mi																			
	Z	20 Std. levels (IAFO)						2 levels			Sfc										
	Time	6 hrs/ 3 hrs																			
Obs. synch.	X, Y, (Z)	10 min. (1 min)																			

* Includes Measurements of Swells

2. AMOP 210 REQUIREMENTS Agency Name - Support of Global Operations

Geographic location		Deep Ocean/N. American Coast out to 400 n. mi.																			
Vertical layer		Sfc to 5000m	Sfc to 5000m	Sfc Thru THCL	Sfc Thru THCL						Sfc					Sfc	Sfc		Sfc		
Range		0 to 360°	0.1 to 6 KTS	10 to 40 0/00	-6 to 35°C						0 to 100 FT	2 to 40 sec	0 to 360°	-15 to 40°C		900 to 1060 mb	-30 to 40°C		0 to 8 in/hr	0 to 360°	0 to 100 KTS
Maximum error		10°	0.1 KTS	0.5 0/00	0.1°C						6 FT	2 sec	10°	0.5°C		1 mb	1°C		0.1 in/hr	10°	5 KTS or 10%
Duration of ob.		30 min AVG	30 min AVG	Inst	Inst						10 min			Inst		Inst	Inst		Inst	10 min	10 min
Sampling intensity	X, Y	600/100 n.mi.			600/100 n.mi.						600/100 n.mi.					600/100 n.mi.	600/100 n.mi.		600/100 n.mi.		
	Z	Std levels	Std levels	50m	50m						N/A					N/A	N/A		N/A		
	Time	12/6 Hrs.			12/6 Hrs.						12/6 Hrs.					12/6 Hrs.	12/6 Hrs.		12/6 Hrs.		
Synch. of obs.	X, Y	10 min			10 min						10 min					10 min	10 min		10 min		
	Z	5 min			5 min						N/A					N/A	N/A		N/A		

3. RESULTS OF ASSESSMENT

Requirements fully met: Wave Measurements, Air Temperature, Atmospheric Pressure, Dew Point, Precipitation Rate and Wind Velocity.

Requirements partially met and why: All other requirements listed in 2 above would be met with the exception of

- o the 30 min duration of ob for current dir. and speed: Tentative "system" allows 10 min.
- o the 50 m Z sampling intensity for salinity and water temp. thru thermocline: Tentative "system" has 100 m increments from 200 to 600 m.

Requirements not met and why: Tidal Fluctuation: Uncertainty about ob from buoy unattended for long periods
Total Cloud Amount: Judged better done by other means
Cloud Base and Rawinsonde: Considered beyond 5-year Buoy SOA.

Page 1

AMP #210 (Cont.)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE PROPOSED DATA BUOY SYSTEM

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Parameter		Tidal Flux	Total Cld Amt
Geo. location		DO/CNA	
Vertical layer		SFc	Above SFc
Range		0 to 30 FT	0 to 10/10
Maximum error		1 FT	2/10
Duration of ob.		Inst	Inst
Sampling intensity	X, Y	600/100 n.mi.	600/100 n.mi.
	Z	N/A	N/A
	Time	12/6 Hrs	12/6 Hrs
Ob. sync	X, Y	10 min	10 min
	Z	N/A	N/A

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YEAR STATE OF THE ART FOR THE PROPOSED BUOY SYSTEM

Parameter		Cld Base	Rawin-sonde (Temp, Press, RH, and wind)
Geo. location		DO/CNA	
Vertical layer		SFc to 50K Ft	SFc to 50K Ft
Range		100 to 50K Ft	Std
Maximum error		20%	std
Duration of ob.		Inst	Inst
Sampling intensity	X, Y	600/100 n.mi.	600 n.mi.
	Z	N/A	Signif. levels
	Time	12/6 Hrs	12 Hrs
Ob. sync	X, Y	10 min	1 Hr
	Z	N/A	1 Hr

Remarks

APPENDIX I, PART C. GENERAL QUESTIONS FOR AGENCY REPRESENTATIVES

General Questions Related to the Refinement of Data Requirements

The attached statements and general questions pertain to problems that arose during the assessment of agencies' requirements for oceanographic and marine meteorological data. These problems need resolution to enable establishment of complete and valid data requirements for use in the development of evolutionary national data buoy systems. Following a review of the accompanying assessment of previously stated data requirements, the agencies are requested to submit coordinated answers to each of the applicable attached general questions.

(In addition to the general questions, specific questions have been prepared for each agency-mission-operation.)

General Questions

1. An assessment is being made to determine the duration of observation for each parameter that will be representative for the data use and for the particular type of buoy employed. Present indications are that the time span of representative observations will be either instantaneous (i.e., few secs. or less) or a short period average (i.e., 10 minutes or less). Will this approximation to your stated requirements suffice? If not, please detail duration of observation (time span) acceptable for each parameter and reasons for requirement.

2. The maximum allowable errors (acceptable accuracies) for certain parameters, e.g., Current Speed, Wave Height, Wave Period, and Wind Speed, should be expressed as a more stringent accuracy for low values in the range and more relaxed for the higher values of the parameter. For example, in the tentative national characteristics for Current Speed, the potential 5 yr SOA is expressed as 0.03 kts or 1% - the appropriate (or greater) value should be applied according to the magnitude of the current speed (0.03 kts accuracy applies to speeds up to 3 kts and 1% applies above 3 kts). Will you please restate your appropriate maximum allowable errors in terms comparable to the listing for the tentative National Data Buoy Parameters and Characteristics for at least Current Speed, Wave Height, Wave Period and Wind Speed?

3. As indicated in the tentative data-buoy table, there will be data available for parameters other than those requested. Would any of these additional parameters be of value in the support of this operation or activity? If additional parameters are desired, please state full details of the requirement in the appropriate spaces on the attached form.

4. The vertical sampling intensity (z) for the tentatively proposed system incorporates 20 levels from the IAPSO standards down through 5000 meters - i.e., 0, 10, 20, 30, 50, 75, 100, 150, (2, 3, 4, 5, 6, 8, 10, 15, 20, 30, 40, 50) x 100 meters. Will this approximation to your stated requirements suffice? If not, please state details of your requirement for each parameter.

5. According to some of the stated requirements, there has been some misunderstanding in what is referred to as the synchronization of observations in the horizontal (x, y) and vertical (z). These characteristics are intended to define the allowable time lapse between all observations in the horizontal area of interest of a particular parameter and the corresponding allowable time lapse between all similar observations in a given vertical sensor array. Since some requirements were stated in dimensions (e.g., ft, mi, etc.) other than time, please review the statement of this characteristic with consideration given to the tentatively proposed parameter and characteristics table and make requisite revisions.

6. There was a division made at 400 n. miles from the N. American coast between the broad synoptic-scale requirements of the deep ocean (about 500 n. mi spacing) and the finer scale requirements of the continental shelf and/or coastal waters of N. America (about 100 n. mi spacing). These spacings were not intended to be uniform throughout these areas but would be a function of the variability of the parameters of interest. However, the division between scale of the spacing between observations for the coastal water requirements and the really fine (micro-scale) requirements of the near shore and estuary observations has not been as clearly defined. I tentatively planned to deploy the first line of buoys for the medium-scale coastal water requirements in the order of 10 to 25 n. miles out from the shore line. Please state any requirements that deviate from this.

7. Different agencies have requested tidal fluctuations, tide height, deep sea tide and tidal variations. Are these parameters the same and thus could be measured by the same instrumentation? If not, please give details of the special requirement and the recommended means for satisfying it.

8. In many cases x, y sampling intensity which should be given in nautical miles was stated in "miles." This can cause a misunderstanding of the requirement. Please give this value in nautical miles (e.g., 400 n. mi), it is not now in that form.

9. Do requirements for data "to the bottom" imply the need for a recoverable sensor package rigidly attached to some portion of the anchoring system, regardless of ocean depth? If so, give complete requirements for all parameters to be measured at this ocean bottom location.

10. If we have missed an area where some difficulty exists between a given requirement and the tentatively proposed capabilities of the data-buoy system would you please identify and state the problem that needs resolution and include a discussion or clarification.

APPENDIX I, PART D. TYPICAL SPECIFIC QUESTIONS FOR AGENCY REPRESENTATIVES

I.D.1 Specific Questions Related to the Refinement of Operational Data Requirements

The attached specific statements and questions arose during the assessment of individual agency-mission-operation (AMO) requirements for oceanographic and marine meteorological data. These questions need answers to enable the establishment of complete and valid data requirements for use in the development of evolutionary national data buoy systems. Following a review of the accompany assessment of the applicable AMO data requirements, the agency is requested to submit coordinated answers for each of the attached questions.

(In addition to these specific questions, general questions have been prepared covering problems associated with many AMOs.)

TYPICAL SPECIFIC OPERATIONAL QUESTIONS FOR AGENCY REPRESENTATIVES

1. Is the parameter water pressure (depth) needed only as a reference for the depth at which other oceanographic parameters are measured or as an independent observation? If the latter, please state the detailed characteristics of the requirement.

2. The stated requirement for vertical sampling intensity (Z) of 50 meters from the surface to a depth of 1000 meters for the oceanographic parameters will be met only to a depth of 200 meters since the tentative "system" is planning 100 meter increments from 200 meters to 600 meters and then 200 meter increments through 1000 meters. Will this approximation to your stated requirements suffice?

3. In view of your entries of "unknown", are the proposed ranges and accuracies for the tentative data-buoy "system" parameters as listed on the top of the assessment sheet adequate for the support of your activity? If not, please state desired values.

4. In view of the stated requirement for x, y spacing of 150 n miles for observations in the Deep Ocean, will data from the proposed 500 n mile average grid spacing be of at least limited value?

5. What is the greatest depth implied by the vertical layer requirement of surface to near bottom for the oceanographic parameters?

6. The ranges of air temperature, dew point, and sound speed are slightly different from the proposed system. Will proposed system values suffice?

7. Please clarify duration of observation (6 min.) and time sampling intensity (6 min.) requirements. Does this imply a continuous observation?

8. Is 60 minute duration of observation for wind and current an essential requirement or would a representative short period average (e.g., 10 minutes or less) suffice?

9. Define in greater detail the current transport requirement. Is this computed from other measurements? Will the current measurement capability of the tentative system be of value?

10. Define in greater detail the bottom temperature requirement. Is this intended to be measured only within depths of 625 meters? Does the requirement for bottom temperature imply a sensing device located on the bottom? If not, how close to the bottom is measurement required? (There are practical problems associated with a measurement directly on the bottom and more information is needed. Please give complete details of this requirement.)

11. Are these data obtained primarily at other agencies' requests or for your own use? If these data are obtained for the support of other agencies, please explain in detail which agencies and for what use.

12. Please state details of required biological and chemical parameters and characteristics.

13. Is it essential that the measurement of the geomagnetic field be made at the surface or within 20 meters of surface? Would measurements from a stable platform on the ocean bottom be of value? If not of value in general, would it be of value on the continental shelf?

14. What is the required depth of the vertical layer for measuring oceanographic parameters? (Surface to what depth for each parameter?)

15. Are the 50 n mile x, y spacing and the 1 hour time sampling intensities essential? Would a spacing of approximately 100 n miles and a 3 hour observing and reporting time be of value in the support of your activities? If not, how far from the coast is the 50 n mile spacing and 1 hour time frequency required (e.g., 50 n miles, 100 n miles)?

16. In view of your "no stated data requirements" and the potential of the tentatively proposed data buoy "system" for marine data collection as indicated at the top of the assessment sheet, are there now any marine meteorological or oceanographic data requirements needed for support of any activity in your agency?

I.D.2 Specific Questions Related to the Refinement of Research Data Requirements

The tentatively proposed national data buoy system, having the parameter-measuring capabilities and characteristics listed in the accompanying data requirements assessment sheets, is intended to meet common national data requirements. Actually, the tentative system satisfies more operational data requirements than those for research, although the tentative development plans provide for a system having the flexibility to extend some capabilities to meet a number of research data requirements. Of course, operational data requirements are generally more easily met, because, for corresponding parameters, special and temporal research data requirements are often more stringent and subject to frequent change.

The preliminary technical development plan presented in the 1967 Feasibility Study of National Data Buoy Systems includes funding for a number of special purpose buoys to meet research requirements that exceed the capabilities of the operational data buoy networks.

Agency assistance is requested for the resolution of problem areas arising from the assessment of research requirements that are only partially met or are not met by the tentative operational data buoy networks. Following a review of the accompanying assessment of previously stated research data requirements, the agency is requested to submit answers to each of the applicable attached questions.

Specific Questions for Research Data Requirements

1. Can any research data requirements be re-stated to take advantage of the potential capabilities and characteristics of the tentatively proposed operational system? Please give details of revised or augmented requirements.

2. Which of the stated requirements for measurement of parameters could be met by the tentative data buoy system capabilities by a reduction of grid spacing, a change in position and number of measurements in the vertical, and an increase of temporal reporting? What is the maximum acceptable grid spacing, minimum acceptable number and depths of vertical measurements, and the maximum acceptable reporting period? What area coverage is required (coordinates of region)? How long would the indicated intensity of data collections be required from each specified region?

3. The tentative data buoy system does not include capabilities for measuring many parameters of importance to research, such as chemical properties of ocean water, nutrients, biological variables, magnetic field characteristics, etc. Can the agency recommend instrumentation capable of measuring any of the required (specific) parameters from a data buoy unattended for long periods of time? Give details.

APPENDIX I, PART E. LIST OF INVITED AGENCY DELEGATES

Atomic Energy Commission:

Mr. Stanley S. Seiken
Reactor Development & Technology Division
Atomic Energy Commission
Washington, D.C. 20545

Environmental Science Services Administration:

Dr. Richard E. Hallgren
Director World Weather Systems
Environmental Science Services Administration
Rockville, Maryland 20852

Bureau of Sport Fisheries & Wildlife:

Dr. Lionel A. Walford
Director
Sandy Hook Marine Laboratory
P.O. Box 428
Highlands, New Jersey 07732

Bureau of Commercial Fisheries:

Dr. Julius Rockwell
Bureau of Commercial Fisheries
1801 North Moore Street
Arlington, Virginia 22209

Maritime Administration:

Mr. Raymond T. Traut
Division of Operations
Office of Ship Operations
Maritime Administration
Department of Commerce
Washington, D.C. 20235

Federal Water Pollution Control Administration:

Mr. T.A. Wastler
Office of Estuarine Studies
Federal Water Pollution Control Administration
633 Indiana Avenue, N.W.
Washington, D.C. 20242

U.S. Public Health Service:

Captain James L. Verber
Northeast Marine Health
Science Laboratory
South Perry Road
Narragansett, Rhode Island 02882

U.S. Navy:

M. E. Garrison, RAD M, USN (Ret.)
Op-09B5 Staff
Oceanographer of the Navy
The Madison Building
732 N. Washington Street
Alexandria, Virginia 22314

U.S. Army Corps of Engineers:

Mr. Joseph Caldwell
Chief Technical Advisor
Coastal Engineering Research Laboratory
5201 Little Falls Road, N.W.
Washington, D.C. 20016

U.S. Air Force, Air Weather Service:

Mr. William C. Huyler
Department of the Air Force
Headquarters Air Weather Service (MAC)
Scott Air Force Base, Illinois 62225

Federal Aviation Agency:

Mr. Joseph D. Blatt
Associate Administrator for Developments
Room 1016, Federal Aviation Agency
Washington, D.C. 20553

National Aeronautics & Space Administration:

Dr. J. Robert Porter (SAR)
Program Chief, Earth Resources Survey
Space Applications Programs Office
NASA
Washington, D.C.

Department of State:

Mr. Garret Soulen
Science Officer
Department of State
Washington, D. C. 20520

Bureau of Mines:

Mr. Arthur P. Nelson
Research Director
Marine Mineral Technology Center
United States Bureau of Mines
3150 Paradise Drive
Tiburon, California 94920

Smithsonian Institution:

Dr. I. E. Wallen
Office of Oceanography & Limnology
Smithsonian Institution
Washington, D. C. 20560

National Science Foundation:

Dr. Fred D. White
Head, Atmospheric Science Section
Division of Environmental Sciences
National Science Foundation
Washington, D. C. 20550

U.S. Geological Survey:

Dr. Joshus I. Tracey
Deputy Chief
Office of Marine Geology & Hydrology
U.S. Geological Survey
Department of the Interior
Washington, D. C. 20242

APPENDIX I, PART F. LIST OF OBSERVERS INVITED TO DATA REQUIREMENTS REFINEMENT MEETING

I.F.1 List of Invited VIP Observers

Bureau of the Budget:

Mr. Richard Rettig
Budget Examiner
Bureau of the Budget
Executive Office of the President, Room 330-1/2

Commission on Marine Science Engineering and Resources:

Dr. Samual A. Lawrence
Executive Director
Commission on Marine Science Engineering and Resources
Washington, D. C. 20500

National Council on Marine Resources and Engineering Development:

Mr. H. A. Arnold
Executive Office of the President
National Council on Marine Resources and Engineering Development
Washington, D. C. 20500

Federal Council for Science and Technology:

Dr. Charles V. Kidd
Executive Secretary
Federal Council for Science and Technology
Office of Science and Technology
Executive Office Building, Room 203
Washington, D. C. 20506

Council of Economic Advisors

Dr. Jack W. Carlson
Staff Economist
Council of Economic Advisors
Executive Office of the President
Washington, D. C. 20506

National Science Foundation - Sea Grant Programs:

Mr. Robert B. Abel
Head, Office of Sea Grant Programs
1800 G. Street, N.W.
Washington, D.C. 20550

National Security Agency:

Director
National Security Agency
Attention: R41 (Stenson)
Fort George C. Meade
Maryland 20755

Scripps Institute of Oceanography:

Mr. James M. Snodgrass
Scripps Institute of Oceanography
La Jolla, California 92037

Chevron Research Company:

Dr. F.C. Blake
Senior Research Scientist
P.O. Box 446
La Habra, California 90533

I.F.2 List of Invited Organization Observers

Committee on Marine Research, Education, and Facilities:

Dr. Edwin Shykind
Executive Secretary
Committee on Marine Research Education, and Facilities
Building 159 B, Room 476, Washington Navy Yard
Washington, D. C. 20390

Committee on Ocean Exploration and Environmental Services:

Mr. Walter Hahn
Executive Secretary
Committee on Ocean Exploration and Environmental Services
Room 918, Building 5
6010 Executive Building
Rockville, Maryland 20852

DEMAP Study Group:

Mr. John C. Fry
Executive Office of the President
National Council on Marine Resources and Engineering Development
DEMAP Study Group
Washington, D. C. 20500

MARPEP Task Group:

CDR. R. C. Junghans, USN
Chairman, MARPEP Task Group
Page #1 Building
2001 Wisconsin Avenue, N. W.
Washington, D. C. 20235

Interdepartmental Committee for Atmospheric Sciences (ICAS):

CAPT. Sherman K. Betts, USN (Ret)
Executive Secretary
Interdepartmental Committee for Atmospheric Sciences
Room 5849, Department of Commerce
Washington, D. C. 20230

Interdepartmental Committee for Meteorological Services (ICMS):

Mr. C.E. Roache
Chairman
Interdepartmental Committee for Meteorological Services
Page #1 Building
2001 Wisconsin Avenue
Washington, D.C. 20235

Interdepartmental Committee for Applied Meteorological Research (ICAMR):

Mr. Clayton E. Jensen
Chairman
Interdepartmental Committee for Applied Meteorological Research
Room 348, Page #1 Building
2001 Wisconsin Avenue
Washington, D.C. 20235

National Academy of Sciences Committee on Oceanography (NASCO):

Dr. John C. Calhoun Jr.
National Academy of Sciences
Committee on Oceanography
2101 Constitution Avenue
Washington, D.C. 20418

National Academy of Engineering, Committee on Ocean Engineering:

Dr. Russell Keim
Executive Secretary
Committee on Ocean Engineering
National Academy of Engineering
2101 Constitution Avenue
Washington, D.C. 20418

National Security Industrial Association, OSTAC:

CDR. John H. Jorgenson USN (Ret)
Committee Executive, OSTAC
National Security Industrial Association
Suite 800
1107-19th Street, N.W.
Washington, D.C. 20036

National Oceanographic Data Center:

Dr. Thomas S. Austin
Director
National Oceanographic Data Center
Washington, D. C. 20390

National Science Foundation, Biological & Medical Sciences:

Dr. Harve J. Carlson
Division Director
Biological and Medical Sciences
National Science Foundation
1800 G Street, N. W.
Washington, D. C. 20560

Bureau of Commercial Fisheries:

Mr. Glenn A. Flittner
Bureau of Commercial Fisheries
Box 271
La Jolla, California

U. S. Air Force - Air Proving Ground Center - Eglin AFB:

COL. Brant Walker
Air Proving Ground Center (APGC)
Office of the Staff Meteorologist
Eglin Air Force Base
Florida 32542

Hurricane Research Laboratory:

Mr. Robert C. Gentry
Director Hurricane Research Laboratory
Miami, Florida

Atomic Energy Commission - Environmental Science Branch - Division of Biology & Medicine:

Mr. Arnold Joseph
Marine Scientist
Environmental Science Branch
Division of Biology & Medicine
U. S. Atomic Energy Commission
Washington, D. C. 20545

U.S. Arms Control and Disarmament Agency:

Dr. Herbert Scoville
Assistant Director
U.S. Arms Control and Disarmament Agency
Washington, D.C.

Department of Health Education and Welfare - Water Supply and Sea Resources Program:

Chief, Water Supply & Sea Resources Program
National Center for Urban and Industrial Health
U.S. Department of Health, Education and Welfare
6935 Wisconsin Avenue
Chevy Chase, Maryland 20015

APPENDIX I, PART G. ATTENDEES AT DATA REQUIREMENTS REFINEMENT CONFERENCE 19 MARCH 1968, WASHINGTON, D. C.

1. C. J. Glass - U.S. Coast Guard, DBP
2. CDR. V. W. Rinehart, U.S. Coast Guard, DBP
3. RADM O. R. Smeder - U.S. Coast Guard, DBP
4. CAPT. J. A. Hodgman - U.S. Coast Guard, DBP
5. A. White - U.S. Coast Guard
6. ENS V. L. Whitcomb - U.S. Coast Guard Oceanographic Unit
7. J. E. Wesler - U.S. Coast Guard, DBP
8. P. S. Branson - U.S. Coast Guard, RET
9. J. W. McGary - U.S. Coast Guard Oceanographic Unit
10. Eugene J. Aubert - The Travelers Research Center, Inc.
11. G. M. Northrop - The Travelers Research Center, Inc.
12. L. H. Clem - The Travelers Research Center, Inc.
13. J. P. Pandolfo - The Travelers Research Center, Inc.
14. Peter Mellinger - U.S. Atomic Energy Commission
15. V. Palmer - Maritime Administration
16. Ben King Duffy - Committee on Marine Research, Education and Facilities
17. Clayton E. Jensen - Office of Federal Coordinator for Meteorology
18. Sidney Marcus - National Oceanographic Data Center
19. A. R. Picciolo - National Oceanographic Data Center
20. Robert H. Martin - Naval Weather Service Command
21. CDR. R. C. Hunghans - Chairman, Task Group MARPEP, (Naval Weather Service Command)
22. R. P. Cook - Naval Air Systems Command - AIRS40

23. D. M. Hanson - MARPEP (ESSA)

24. Leonard Bosin - ESSA WB Systems Engineer - Member, MARPEP Task Group

25. R. E. Moses - ESSA

26. W. O. Davis - ESSA

27. R. E. Hallgren - ESSA

28. R. F. Hill - Institute of Ocean Technology, University of Rhode Island

29. R. A. Rettig - Bureau of the Budget

30. John Roche - Office of Research & Development, Maritime Administration

31. Frank V. Melewicz - Systems Research & Development Service, Federal Aviation Administration

32. Robert A. Baltzer - Water Resources Division, U. S. Geological Survey

33. Hugh McLellan - National Science Foundation

34. Fred D. White - National Science Foundation

35. Clifford J. Murino - National Science Foundation

36. E. F. Corcoran - National Science Foundation

37. M. E. Garrison - Office of the Oceanographer, U. S. Navy

38. LT N. T. Monney - Hq Naval Material Command (MAT 0327)

39. H. V. French - NAVOCEANO

40. C. H. Cline - NAVOCEANO

41. J. Osborn - DOT

42. C. Osterberg - AEC

43. Robert Wicklund - Sandy Hook Marine Lab

44. George Nonnemaker - MITRE CORP., Bedford, Mass.

45. A. Fred Feyling - Geodyne Corp., representing Instrumentation Panel, Committee on Ocean Engineering, National Academy of Engineering

46. Robert G. Walden - Woods Hole Oceanographic Institution

47. Sherman W. Betts - I.C.A.S.

48. James M. Snodgrass - Scripps Institution of Oceanography

49. R.A. Schwartzlose - Scripps Institution of Oceanography

50. I.E. Wallen - Smithsonian Institution

51. W. Aron - Smithsonian Institution

52. W.C. Huyler - U.S. Air Force, AWS

53. E.V. von Gohren - U.S. Air Force, AWS

54. B.F. Walker - U.S. Air Force, AFSC

55. F.D. Jennings - ONR

56. F.G. Blake - Chevron Research Company

57. R.W. Farwell - Ordnance Research Laboratory, Pennsylvania State University

58. J.L. Verber - DHEW/PHS

59. T.A. Wastler - USDI/FWPCA

60. John Craven - Chairman, Panel on Ocean Engineering, Committee on Marine Research, Education and Facilities

61. A.T. Pruter - Bureau of Commercial Fisheries

62. Julius Rockwell Jr. - Bureau of Commercial Fisheries

63. John Fry - Marine Science Council

64. H.A. Arnold - Marine Science Council

65. Henry Rugo - MITRE Corp. Bedford, Mass.

APPENDIX II

COMPARATIVE TABULATIONS OF 1968 REFINED DATA REQUIREMENTS

TABLE II.A. COMPARATIVE TABULATIONS OF REFINED OPERATIONAL DATA REQUIREMENTS

REQUIREMENT CHARACTERISTICS

AMD	Geographical Location		Horizontal Spacing		Vertical Layer	Vertical Sampling Intervals	Duration of observation	Time Sampling Intervals	Synoptic Use		Period of Observation						
	Coastal N. A. (CNA)	Deep Ocean (DO)	CNA	DO													
#1 USAF (AWS)		6 recovery areas 480 n. mi. (Sam & Lunar [illegible] line)		200 n. mi.	Sfc	N. A.	Inst [illegible]	[illegible] in oper 8 hrs not in oper	10 min	N. A.	[illegible] with breaks						
#2 USAF (AWS)	NE Gulf of Mexico & [illegible] mi. offshore from Vandenberg AFB		5 pts [illegible] 100 n. mi. [illegible]		Sfc to bottom Sfc [illegible]	LA PBL levels 8 ft and 12 ft	10 min	hrs	[illegible] min	[illegible] min	[illegible] with breaks		Gulf of Mexico Vandenberg AFB				
#3 USAF (AWS)		Global		100 to 600 n. mi.	Sfc	N. A.	Inst	12 hrs	30 min	N. A.	Const						
#14 BCD LaJolla	West Coast 140°W	Pac. Coast to 160°W 10°S to Alaska	60 to 120 n. mi.	120 to 600 n. mi.	Sfc to 100 m (transp) (Sfc to 180 m)	LA levels & bottom to 500 m	10 min Int wave 20 min	1 hrs	30 min	5 min	Const						
#19 BCD Wash. D.C.	West Coast	Pac. Coast to 160°E 10°S to Alaska	60 to 240 n. mi.	240 to 600 n. mi.	Sfc to 875 m	LA PBL levels & 5 m from bottom	10 min	6 hrs	30 min	5 min	Const						
#21 USCG (SV)	CBV B at 56°N 51°W	SV C, D and E in Atl. and N. V. in Pac	N. A. (1 pts)	N. A. (5 pts)	Sfc to 5000 m	LA PBL levels A 50 m from bottom	10 min	6 hrs	30 min	30 min	Const						
#24 USCG Bld. Sect	7 tracks in Atl. 7 tracks in Pac	5 tracks in Atl. 6 tracks in Pac	[illegible] from shore 25 n. mi. 4500 n. mi. 100 n. mi.		Sfc to 5000 m	LA PBL levels & near bottom	10 min	[illegible] Min.	30 min	30 min	Const						
#25 USN Ice Patrol	Grand Banks 39°N to 50°N and 42°W to 55°W		4 pts near 44°N 44°W [illegible] 100 n. mi.		Sfc to 5000 m	LA PBL levels & near bottom (Clar or sfcr)	10 or 3 min	hrs Bl [illegible]	10 min	1 min	[illegible]						
#27 USCG BAR	Ocean areas contiguous to the U. S.		Varies w oper		Sfc to 5000 m	LA PBL levels	10 min	Varies w oper	30 min	30 min	later mission						
#28 USCG Ocean Services	Cont. Shelf of U. S. and Canada	W. Atl. to 20°E, E. Pac. N. of 13°S. Kuroshio Current	Lines at 10, 20, 30 50, 70 & 100 km 100 n. mi. apart	10, 40 n. mi. in lines 200–500 n. mi. apart	Sfc to 200 m Sfc to 5000 m	LA PBL levels above Variable in depths [illegible] m	10 min Const for special ops	6 hrs 6 hrs	10 min Inst for spec. ops	1 min 1 min	Const		CNA: DO:				
#29 USCG Ice Breaking		Arctic and Antarctic		10 to 25 n. mi.	Sfc to 5000 m	LA PBL levels & near bottom	10 min	6 hrs	30 min	30 min	Const						
#30–35 ESSA	N. A. Coast out to 400 n. mi.	Global	60 to 150 n. mi.	300 to 500 n. mi.	Sfc to 5000 m	LA PBL levels & near bottom	Const or about per avg	CNA: 3 hrs DO: 6 hrs	30 min	5 min	Const						
#36 FWPCA	Estuaries & near shore Great Lakes		1, 10 n. mi. 30 n. mi. or shore of lakes		Sfc [illegible] 1 m Sfc [illegible] 10 m	1 m intervals 0, 10, 20, 40, 80 200 m	Inst 3 min [illegible] 3 hrs	3 hrs [illegible]	1 hr	5 min 10 min	Const						Est. & nr. shore Great Lakes
#37 NOAA Code 00		100 m depths (near SE Asia, S. A., Afr. Eq. Atl.)		Single penetr.	Sfc to bottom max 800 m	N. A.	Inst Time const	Const per site	N. A.	N. A.	Const						
#38 NOAA Code 00	30°N [illegible] 32°N 118°W periodic obs.	17°S 86°W 32°N 130°W	3 buoys 10 n. mi. apart within 30 n. mi. of island in max 3 weeks		Sfc to bottom max to 5000 m	Varies deeper near Mat	Inst [illegible]	3 min	1 min	3 to 5 min	Const						
#40 NOAA Code 00		Global		Line pts at 1 liter	Varies water press. [illegible]	Const [illegible] 1000 m	10 min [illegible] 30 min	6 hrs [illegible] 3 hrs	N. A. [illegible] 10 m	N. [illegible] 3 min	Const						
#41 USN (Fleet) Airborne		Global		300 to 600 n. mi.	Sfc to 1000 ft (100 ft first wind obs)	1 to 400 ft, 2 to 700 ft, 5 to 1000 ft	10 min	6 hrs	hr	1 hr	Const						
#42 USN Weather Ship & Subsch		Global		300 to 500 n. mi.	Sfc to bottom max 5000 m	LA PBL levels	Inst [illegible] 6 min	6, 12 hrs	10 min	N. A.	Const						
#43 USN PMR	Pt. Hope 55°30' 164°40' W 119°30' 123°W	Bering Strait 65°30' 169°40' N 160°00' 160°00' W	Varies generally 30 to 50 n. mi.		Sfc to bottom max 4875 m	LA PBL levels	Inst waves 30 min	3, 6 hrs	10 min	1 min	Const with breaks						

* Varies with parameter

† 600 n. mi. spacing is indicated by Tolstoy & [illegible] (Mr. King is aware of USAF, ESSA and USN data requirements)

‡ Grid indicated initially at 400 n. mi. by Tolstoy & [illegible]

● Denotes a change or an addition

A

ED OPERATIONAL DATA REQUIREMENTS

Duration of Observation	Time Sampling Intensity	Synch of Obs x, y	Synch of Obs z	Period of Operation	Current velocity	Salinity	Sound speed	Water temperature	Water pressure	Ambient light	Ambient noise	Transparency	Wave measurement	Air temperature	Atmospheric electricity	Atmospheric pressure	Dew point	Insolation	Precipitation rate	Wind velocity	Winds	pH	Packed of flux	Precipitation rate	Sediment deposit	Tidal fluctuation	Turbidity	Bathymetry	Aerial photography	Gravity	Total visual angular
Inst 5 min 10 min	1 to 5 hrs in oper 6 hrs not in oper	10 min	N A	Cont with breaks	x	x		x					x	x		x			●	x											x
10 min		10 min	1 min	Cont with breaks	x	x	x	x	x	●	●	●	●	x	x	●	x	●	●	●	x				●						
10 min	Varies w oper	10 min	N A		Gulf of Mexico Vandenberg AFB										●			●			●										
Inst	12 hrs	30 min	N A	Cont		x		x					x	x		x	x				x										
10 min (Int wnd (60 min)	8 hrs	30 min	min	Cont	x	x		x				x		x																	
10 min	hrs	30 min	5 min	Cont	●	x		x						x																	
10 min	6 hrs	30 min	30 min	Cont	x	x	x	x	x	●			x	x		x	●				x	x								x	
10 min	6 hrs / Monthly	30 min	30 min	Cont	x	x	x	x	x	●			x	x		x	●				x	x								x	
or 30 min	hrs / Biweekly	10 min	1 min	Cont / Feb July	x	x		x	x	●			x	x		x	●	●	●		x									x	
10 min	Varies w oper	30 min	30 min	Inter mittant	x	x	x	x	x				x	x		x					x										
10 min	6 hrs	10 min	1 min		x	x	x	x	x	●		●	x	x	●	x	●	●	●		x	x		●	●					x	
Cont for special ops	5 hrs	10 min Inst for spec ops	1 min	Cont	(CNA) (DO) x	y	z	x	x				x	x		x					x	x		●	●					x	
10 min	6 hrs	30 min	30 min	Cont	x	x	x	x	x	●		●	x	x		x					x	x					x			x	
Inst or short per avg	CNA DO 6 hrs hrs	30 min	min	Cont	x x	x x	● ●	x x	● ●	(CNA) (DO)			x x	x x		● ●	x x		●		x x										
Inst, 5 min, 10 min, 1 hr	3 hrs 3 hrs	1 hr 1 hr	5 min 10 min	Cont	x	y		x		●		●		●				●			x	x	x						●		
					Gulf & Atl coast Great Lakes																										
					x			x		●		●		●				●			x	x	x						●		
Inst Tide cont	1 obs per site	N/A	N/A	Cont					x																	x					
Inst curr ±2 min	5 min	1 min	3 to 5 min	Cont	x			x	x	x																x	x				
±10 min 30 min	6 hrs	N/A curr 10 min	N/A curr 3 min	Cont	x	x	x	x	x			x	x	x			x				x				x					x	x	x
±10 min	6 hrs	1 hr	1 hr	Cont																	x										x
Inst Inst wnd ±10 min	6, 12 hrs	10 min	N/A	Cont	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x					x
Inst wave 30 min	3, 6 hrs	10 min	1 min	Cont with breaks	x	x	x	x					x	x		x	x				x									x		x

(ments)

B

TABLE II.B. COMPARATIVE TABULATIONS OF REFINED RESEARCH DATA REQUIREMENTS

REQUIREMENT CHARACTERISTICS

AMO	Geographical Location		Horizontal Spacing		Vertical Layer	Vertical Sampling intensity	Duration of Observation	Time Sampling Intensity	Synch. of Obs		Period of Operation
	Coastal N. A. (CNA)	Deep Ocean (DO)	CNA	DO					x, y	z	
#3 ACEBC	Coastal N. A. Great Lakes depth ≥ 125 m	Coastal Hawaii depth ≥ 125 m	≤ 500 n. mi	≤ 500 n. mi	Sfc	N/A	≤ 10 min	6 hrs	5 min	N/A	Cont.
#4 BCF-Galveston	Gulf of Mexico and Caribbean Sea	Caribbean Sea	10 n. mi near shore 50 n. mi off shore 100 n. mi deep water		Sfc to near bot max 5000 m	IAPSO levels & 125, 175, 250 and 1200 m	≤ 10 min	6 hrs	30 min	30 min	Cont
#9 BCF-Miami	Gulf of Mexico	Trop. Atlantic 20°N-20°S (Special areas)	500 n. mi	500 n. mi 10 to 30 n. mi	Sfc to 500 m	IAPSO levels	≤ 10 min	12-24 hrs 3-6 hrs	10 min	1 min	Cont.
#10 BCF-Beaufort	Cont. shelf (out to 200m depth) Maine to Texas		100 n. mi		Sfc to bot-max 200 m	IAPSO levels	1 to 5 min	3 hrs	10 min	1 min	Cont.
#11 BCF-Beaufort	Estuaries & near shore areas Cape Cod to Texas		Varies		Sfc to bottom-max 200 m	Varies w/area of interest	1 to 5 min	3 hrs	10 min	1 min	Cont. 4 mo. yr
#12 BCF-Seattle	W. Coast 42°N to 60°N out to 400 n. mi from coast	W. Coast to 160°E, 40°N to Bering Sea	5 to 60 n. mi (Spec. areas) (for 15 n. mi.)	60 to 100 n. mi	Sfc to 5000 m	IAPSO levels	≤ 10 min	Sfc-10 m 12 hrs 10 m-bot 24 hrs	12 hrs	1 min	Cont.
#13 BCF-Stanford	West Coast	W. Coast to 180° and N of 20°S	60 to 100 n. mi in lines ~600 n. mi apart	100 to 300 n. mi in lines ~600 n. mi apart	Sfc to 800 m & bottom	Varies 7 to 25 levels	≤ 10 min 6 hr avg. for curr.	3/8 hrs Cont. for curr.	10 min to 30 min	1 min	Cont.
#15 BCF-Woods Hole	40°N-45°N, 64°W-74°W on shelf No deep water or Gulf Stream		(Sfc) 100 to 300 n. mi (Sub-sfc) 30 to 100 n. mi		Sfc to 200 m	IAPSO levels	≤ 10 min	3 hrs	10 min	1 min	Cont.
#16 BCF-Booth Bay Harbor	Gulf of Maine Offshore		25 to 30 n. mi or at least 3 buoys		Sfc to bottom	IAPSO levels & ≤ 5 m from bottom	≤ 10 min	3 hrs	10 min	1 min	Cont. 20 days at a time
#17 BCF-Booth Bay Harbor	Gulf of Maine onshore		8 to 15 n. mi		Sfc to bottom	IAPSO levels & ≤ 5 m from bottom	≤ 10 min	3 hrs	10 min	1 min	Cont
#18 BCF-Washington, D. C.	Cont. shelf Cape Hatteras to Maine		10 to 20 m contours		Sfc & bottom	N/A	≤ 10 min	3 hrs	10 min	1 min	Cont.
#20 BSF-Sandy Hook	End of Georges Bank to Florida Keys out to 150 m depth		Lines out fr. a coast 100 n. mi apart spacing in lines ≤ 1, 2, 5, 10, 20, 30, 50 n. mi from coast-line		Sfc to bottom	Ea. 5 m to 30 m then IAPSO levels to bottom	≤ 10 min	1 hr in special areas 3 hrs elsewhere	5 min in special areas 10 min elsewhere	1 min	Apr. Nov. ends ~ 11/69
#26 USCG-Ice Patrol	Grand Banks Labrador Sea	Baffin Bay Hudson Strait	30 to 100 n. mi	30 to 100 n. mi	Sfc to 5000 m	IAPSO levels & more intense near surface	≤ 10 min & 30 min avg. spec. areas	6 hrs	10 min	1 min	Intnnl longest period 30 days
#31, 32, 36, 37 ESSA	Coastal N. America	Deep Ocean Global	60 to 150 n. mi (only specific areas) (at one time)	300 to 600 n. mi	Sfc to 5000 m	IAPSO levels & near bottom	Near Inst.	6 min	N/R	5 min	Cont. but move loc. ea. 30 days
#40 HEW	Cott. & Est. & 2 buoys in areas at 40°30'N-40°15'N and 73°40'W-72°55'W & 38°30'N-39°00'N and 74°30'W-75°00'W		25 to 50 n. mi ≤ 50 n. mi from coast		Sfc to 200 m	IAPSO levels	≤ 10 min	3 hrs	10 min	1 min	Cont. not yet started

* Varies with parameter.
● Denotes a change or an addition.
AMO's 21 and 22 had not submitted refinement material as of the date of this report

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NTS

Sa.	Period of Operation	Current velocity	Salinity	Sound speed	Water temperature	Water pressure	Ambient light	Ambient noise	Transparence	Wave measurement	Air temperature	Atmospheric pressure	Dew point	Insolation	Precipitation rate	Wind velocity	Carbon dioxide	Ozone	pH	Propagation loss	Total radiation out	Radiological chemicals	Sediment deposit	Templet	Tidal fluctuation	Turbidity	Bathymetry	Bottom photographs	Total cloud amount
		PARAMETER RQTS BEST MET BY BUOYS																		POTENTIAL TECHNICAL PROBLEMS									BETTER MET BY SC BUOY
N/A	Cont.	●			●					x	●						x												
30 min	Cont.	x	x		x				x		x		●	x	x		x		x										x
● 1 min	Cont.	x x	x x		x x						x x				x		x x		x x										
● 1 min	Cont.	x	x		x		●		●		●						x		x										
● 1 min	Cont. 4 mo yr	x	x		x		●		●		●						x		x										
1 min	Cont.	x	x		x	x	●		●	●					x		x												
● 1 min	Cont.	●	x		x	x	●		x		●		●	●	x		●		x			●				●	●			●
● 1 min	Cont.	x	x		x		x		x								x		x										
1 min	Cont. 26 days at a time	x	x		x		●		x	x	x		x	x	●	x	x		x							x			x
1 min	Cont	x	x		x		●		x	x	x		x	x	●	x	x		x							x			x
● 1 min	Cont	x			x												x												
● 1 min	Apr. - Nov. ends 11/68	x	x		x												x												
1 min	Internet longest period 30 days	x	x	x	x	x	●			x	x		x	●	●	●	x								x				
5 min	Cont. but move loc. ea. 30 days	x	x		x																			●					
● 1 min	Cont not yet started	x	x		x	●	●		●	●	●		●	●	●	●	●	●	●	●	●		●	●	●	x	●	●	●	●

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TABLE II.B. (Continued). COMPARATIVE TABULATIONS OF REFINED RESEARCH DATA REQUIRE

REQUIREMENT CHARACTERISTICS

AMO	Geographical Location		Horizontal Spacing		Vertical Layer	Vertical Sampling Intensity	Duration of observation	Time Sampling Intensity	Synch. or Cont.		Period of Operation	Current	
	Coastal N. A. (CNA)	Deep Ocean (DO)	CNA	DO					x, y	z			
#44 NSF-Duke U	On Blow Bay N. Car. to 100 n. mi out in Gulf Stream		A line of buoys at 10, 25, 50, 75, 100 & 200 m & 1 buoy ~ 30 n. mi on either side of line		Sfc to bottom max 200 m	0, 10, 20, 30, 40, 50 m then IAPSO levels	1 min	12 hrs	10 min	10 min	Cont with intermittent breaks	x	x
#47 NSF-U of Miami	Florida Straits off Bimini, Bahamas and Miami		Special points ~ 1 and 7 n. mi from source source		Sfc to bottom max 800 m	25, 50, 100 150, 200 & each 150 m to bottom	Inst to 1 min. avg.	Not stated	5 min	1 min	Cont	x	
#55 ONR-NYU	East Coast & Gulf Stream	World Oceans	20 n. mi in strong curr. 200 to 300 n. mi elsewhere		Sfc to bottom max 5000 m	Sfc, 500, 1000, 1500, 2000, 3000, 4000 & 5000 m	20 min avg.	6 hrs	10 min	1 min	Cont not yet started	x	x
#57 ONR-NYU	East Coast & Gulf Stream	World Oceans	20 n. mi in strong curr. 200 to 300 n. mi elsewhere		~ 20 m to ~ 1000 m	~ 5, 10, 20 m IAPSO levels to 1000 m	20 min avg.	6 hrs	10 min	1 min	Cont. not yet started	x	x
#58 NSF-Woods Hole	East Coast N. of 27°N, East of 77°W and W of 5°W. S of 46°N	20°N to 40°N 65°W to 75°W & Global opportunity of opportunity	6 n. mi in Gulf Stream 20 n. mi outside of Gulf Stream		Sfc to 5000 m	IAPSO levels OK in some areas should be flexible for other areas	Inst to 10 min	1 hr	10 min	1 min	Cont	x	x
#62 Smithsonian Institute	Not stated	Not stated	10 n. mi	10 n. mi	Sfc to 280 m	3, 65, 130, 190 & 280 m	Not stated	48 hrs	Not stated	Not stated	2 yrs not yet started	(Requ	
#76 ORL-Penn St	Gulf Stream	World Oceans	300 n. mi	300 n. mi	Sfc to 5000 m	IAPSO levels	2 min	6 hrs	10 min	1 min	Cont.	x	x
#77 ORL-Penn St.	Key West area Gulf Stream (Small selected areas of)	World Oceans	5-5 n. mi 3 or 4 buoys in a line in each area		Sfc to 5000 m	20 levels denser near top	Inst waves avg	1 min	1 min	1 min	Cont	x	
#79 USN-Mar Eng Lab	East Coast & Caribbean (World wide in future)	Caribbean	1 pt at a time	1 pt at a time	Bottom to 16 m abv bottom max depth 310 m	Bottom 1, 5, 3, 5, 6, 9 & 16 m above bottom	1 min	30 min	N. A.	1 min	Cont w breaks 1 yr in area	x	x

* Varies with parameter

● Denotes a change or an addition

AMO's #s 49, 51, 59, 65, 66, and 70 had not submitted refinement material as of the date of this report.

A

S OF REFINED RESEARCH DATA REQUIREMENTS

PARAMETER RQTS. BEST MET BY BUOYS | POTENTIAL TECHNICAL PROBLEMS | BETTER MET BY NON-BUOY

eal ing ity	Duration of observation	Time Sampling Intensity	Synch. of Obs. x, y	Synch. of Obs. z	Period of Operation	Current velocity	Salinity	Sound speed	Water temperature	Water pressure	Ambient light	Ambient noise	Transparency	Wave measurement	Air temperature	Atmospheric electricity	Atmospheric pressure	Dew point	Insolation	Precipitation rate	Wind velocity	Ice accumulation	Oxygen	pH	Propagation loss	Tidal fluctuation	Tidal radiation out	Turbidity	Bottom photography
30, 40 ●	1 min	12 hrs	10 min	10 min	Cont with intermittent breaks	x	x		x												●		x			●			
60 & each	Inst. to 1 min. avg ●	Not stated	5 min	1 min	Cont	x			x				x								x					x			
1000 ● 00 0 &	20 min avg.	8 hrs	10 min ●	1 min ●	Cont not yet started	x	x	x	x			x											x						
00 m ●	20 min avg.	6 hrs	10 min ●	1 min ●	Cont not yet started	x	x		x					x		x	x	x		x			x				●		
vels me uld be or as	Inst to 10 min ●	1 hr	10 min	1 min ●	Cont	x	x		x	x				x		x				x									
m	Not stated	48 hrs	Not stated	Not stated	2 yrs not yet started	(Required Parameters are Considered Beyond Five Year SOA)																							
●	2 min	6 hrs	10 min ●	1 min	Cont	x	x	x	x	●	x	9	x	x	x		x	x	●	x	x	●			●				●
ar	Inst waves avg ●	1 min ●	1 min ●	1 min ●	Cont	x	x	x	x	●	x	●	x	x	x		x	x	●	x	x								
s &	1 min	3 min	N A	1 min	Cont w breaks 1 yr in area	x	x		x		x		●										x					x	

B

TABLE II.B. (Continued). COMPARATIVE TABULATIONS OF REFINED RESEARCH DATA REQUIREMENTS

REQUIREMENT CHARACTERISTICS

AMO	Geographical Location		Horizontal Spacing		Vertical Layer	Vertical Sampling Intensity	Duration of Observation	Time Sampling Intensity	Synch. of Obs.		Period of Operation	Current velocity	Salinity	Sound
	Coastal N. A. (CNA)	Deep Ocean (DO)	CNA	DO					x, y	z				
♦ 80 USN-Mar Eng. Lab.	Cont. Shelf & Upper water within telemetry distance of land		4 buoys ● in a sq. 20 n. mi apart		Sfc	h	Inst ●	Cont.	Milli-second	N/A	Cont. not yet started			
82 ● USN-NSR & DC	Anywhere in N. Atlantic or Pacific where seastate of 4 to 6 is observed ●		100 to ● 600 n. mi	100 to ● 600 n. mi	Sfc	N/A	30 min	6 hrs ●	N/A	N/A	Inter-mittent			
♦ 84 ONR-Scripps Institute of Oceano.	Calif. curr. 22.5°N to Columbia River	20°N to ● 60°N and 110°W to 130°E	● 100 n. mi	● 500 n. mi	● Sfc to 3000 m ●	IAPSO levels	Inst to Coat. ●	1 hr	● 10 min	● 1 min	Cont. ends 1974	x	●	x
♦ 85 ● AEC-Scripps		Pacific Ocean primarily deep curr.		Unk	● Sfc to 10,000 m	~ 3 m off the bottom	Inst	● 1 hr	● 1 min	Unk	Cont.	x		
♦ 88 ● USN-NUWC	300 mile circle out from San Diego		1 to 4 ● buoys in a 20 x 10 n. mi sq.		Sfc to bottom max depth 700 m	~ 50 levels from 7 to 70 m part ●	Inst to 10 min ●	4 hrs	N/A	● 10 min	Cont. ends Feb. 71	x		x
♦ 89 USN-NAVAIR-SYSCOM	Gulf of Mexico and N. A. Coast out to 150 n. mi from 15°N to 60°N	0° to 30°N & 150°W to 130°E & 35°W to NA, 30°N to 45°N & 15°W to 40°E. Antarctic 60°S to S. Pole	300 to 500 n. mi ● all areas. 30 to 60 n. mi grid in spec. loc., for curr. & w. temp. a 30 to 100 & 0.1 n. mi grid in spec. loc.		Sfc to 500 m	● IAPSO level	Inst wind ~ 10 min if > 20 knots	12 hrs 30-60 n. mi 3 hrs. 0.1 n. mi 2 hrs	30 min 10 min 30 sec	30 sec	Cont.	x		x
♦ 94 ● BCF-Honolulu		Pacific Ocean 0° to 35°N & 130°W to 180°		60 n. mi in curr. 500 to 800 n. mi elsewhere	Sfc to 1500 m	IAPSO levels but denser in thcl.	< 10 min	24 hrs	10 min	1 min	Cont.	●	●	●
♦ 99 ● BCF-Alaska	Estuaries & Cont. shelf of Alaska	50°N to Bering Straits & E of 165°E	Varies ~ 50 to 300 n. mi	Varies ~ 300 to 1000 n. mi	Sfc to unk	0, 50, 100, 200 300 m then unk	Not stated	Not stated	Not stated	Not stated	Cont.	●	●	●

* Varies with parameter.

● Denotes a change or an addition.

AMO's 81, 86, 87, 92, 93, 94 and 97 had not submitted refinement material as of the date of this report.

A

REFINED RESEARCH DATA REQUIREMENTS

	Duration of Observation	Time Sampling Intensity	Res. of Obs. x, y	Res. of Obs. z	Period of Operation	Current velocity	Salinity	Sound speed	Water temperature	Water pressure	Ambient light	Ambient noise	Transparency	Wave measurement	Air temperature	Atmospheric electricity	Atmospheric pressure	Dew point	Insolation	Precipitation rate	Wind velocity	Carbon dioxide	Oxygen	Magnetic field intensity	Pictures of fish	Tidal fluctuation	Total radiation out	Vertical current	Total cloud amount
	Inst	Cont.	Milli-second	N A	Cont. not yet started																		x						
	30 min	4 hrs	N/A	N A	Inter-mittent								x																
	Inst to Cont.	1 hr	10 min	1 min	Cont. ends 1974	x	●		x	●	○		●	●	x		x	x	x	○	x	●			●	●	●	●	-
	Inst	1 hr	1 min	Unk	Cont	x																							
	Inst to 10 min	4 hrs	N/A	10 min	Cont ends Feb. 71	x			x			x		x							x								
	Inst wind 10 min if > 20 knots	12 hrs 30-40 n. mi 3 hrs. 0 1 n. mi 2 hrs	30 min 10 min 30 sec	30 sec	Cont.	x			x					x	x		x	x	x		x						x		
	< 10 min	24 hrs	10 min	1 min	Cont.	●	●		●		●		●										x						
90	Not stated	Not stated	Not stated	Not stated	Cont	●	●		●						●		●				●								

PARAMETER RQTS. BEST MET BY BUOYS | POTENTIAL TECHNICAL PROBLEMS | BETTER MET BY NON-BUOY

B

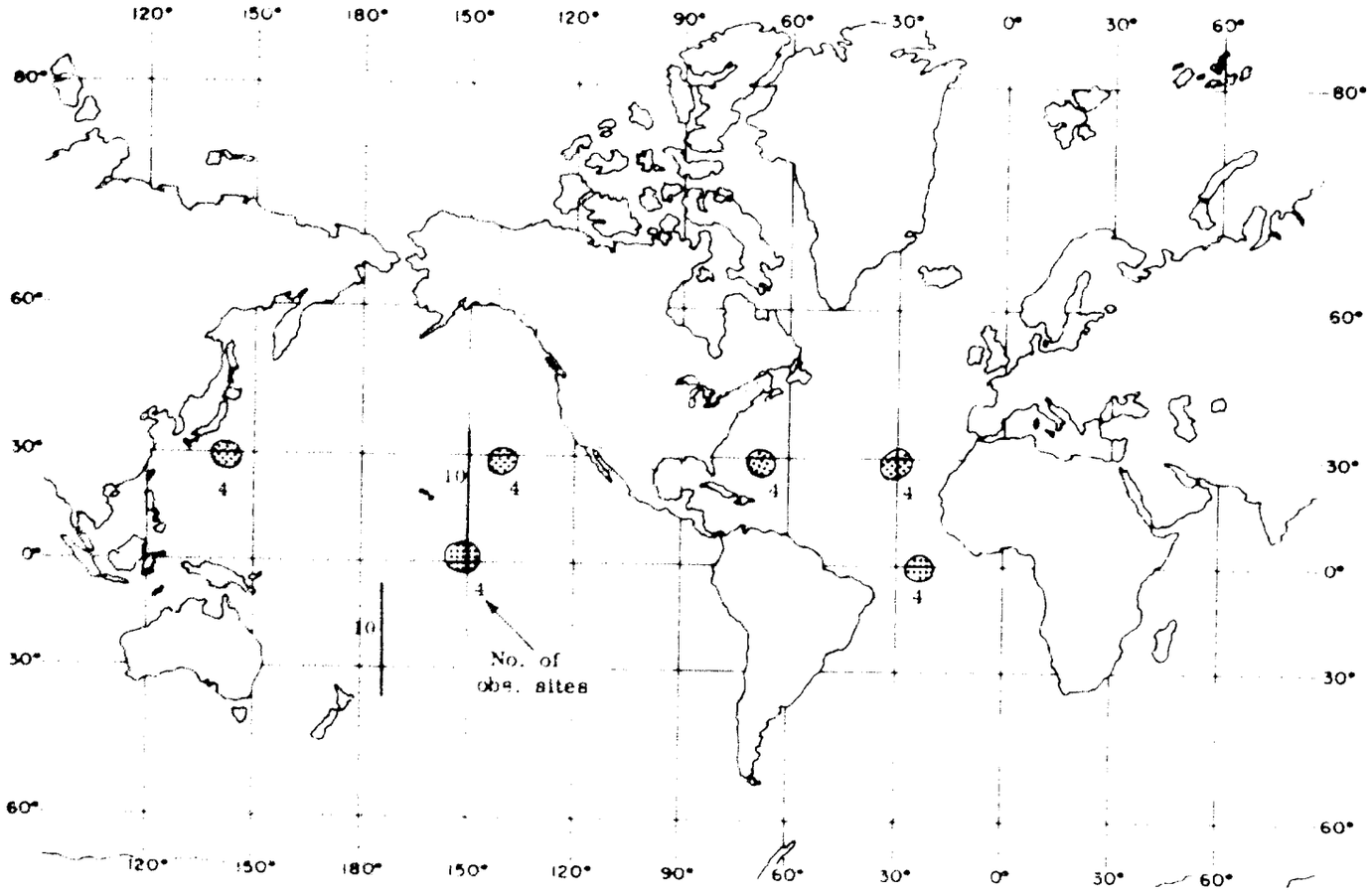
APPENDIX III

CHARTS SHOWING GEOGRAPHICAL AREAS OF INTEREST FROM WHICH DATA ARE REQUIRED FOR INDIVIDUAL AMOs

APPENDIX III, PART A. GEOGRAPHICAL AREAS AND REQUIRED NUMBER OF OBSERVATION SITES FOR OPERATIONAL AMOs

Le. n

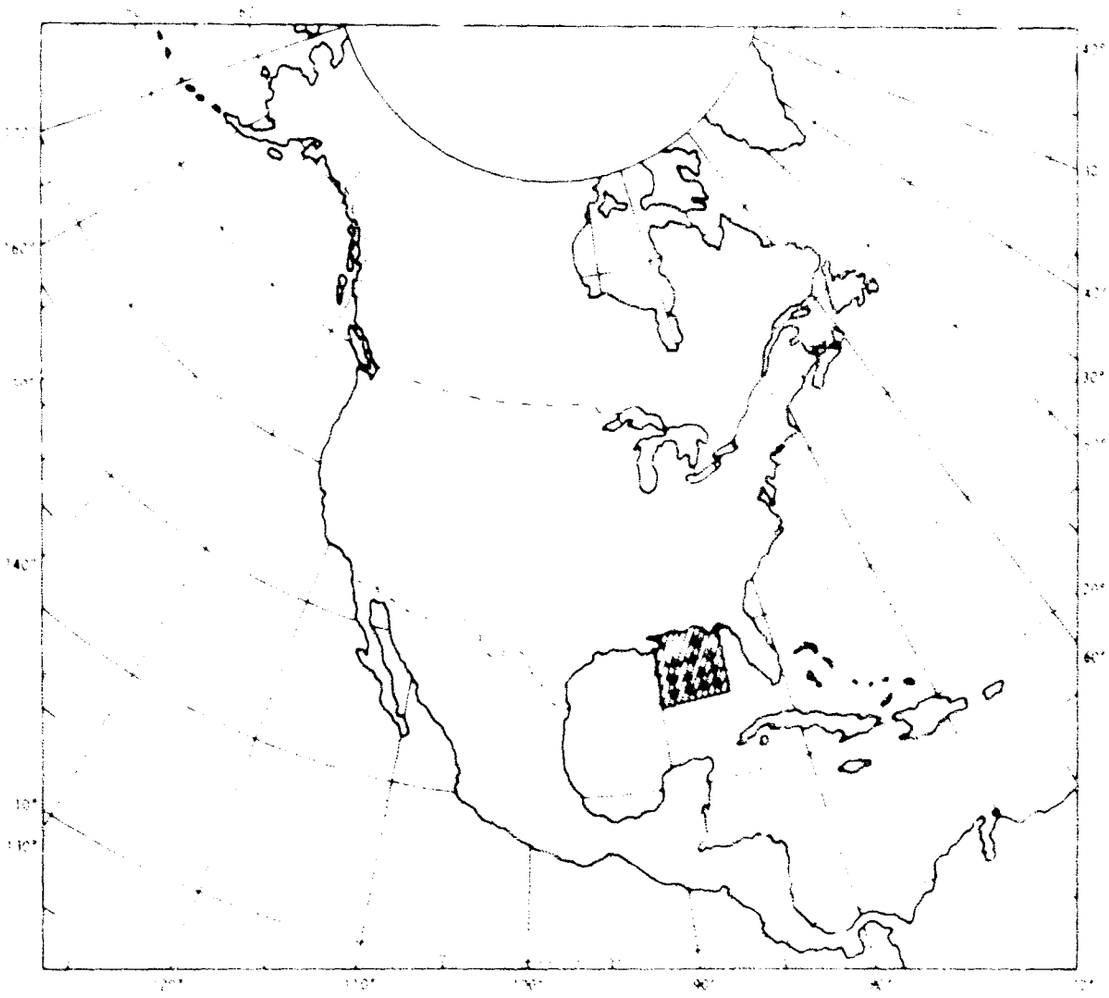
- Area = 3 Atlantic and 3 Pacific Recovery Areas = 486 n. mi Diameter Plus 2 Lunar Recovery Lines in Pacific
- X, Y Spacing = 200 n. mi.
- Total Observation Sites Required = 44



AMO #1—USAF (AWS)—Support for recovery of aerospace vehicles.

Legend:

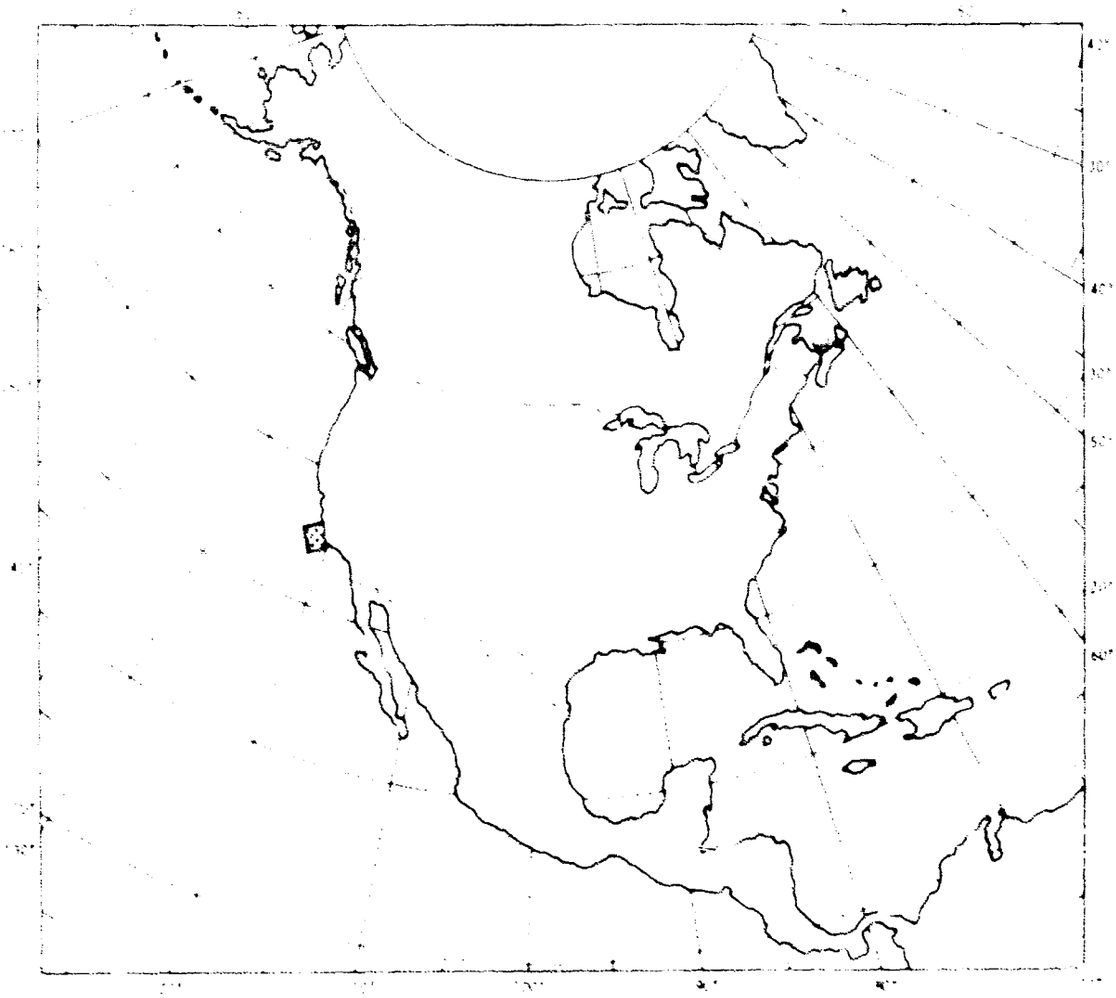
- Area – Northern Gulf of Mexico from the Coast S to 25°N and 90° W to 84°W
- X, Y Spacing = 5 Specified Points and 150 n. mi. in Rest of Area
- Total Observation Sites Required = 12



AMO #2A—USAF (AWS)—Support National Defense Weapons and Tactics RDT & E at Eglin AFB.

Legend:

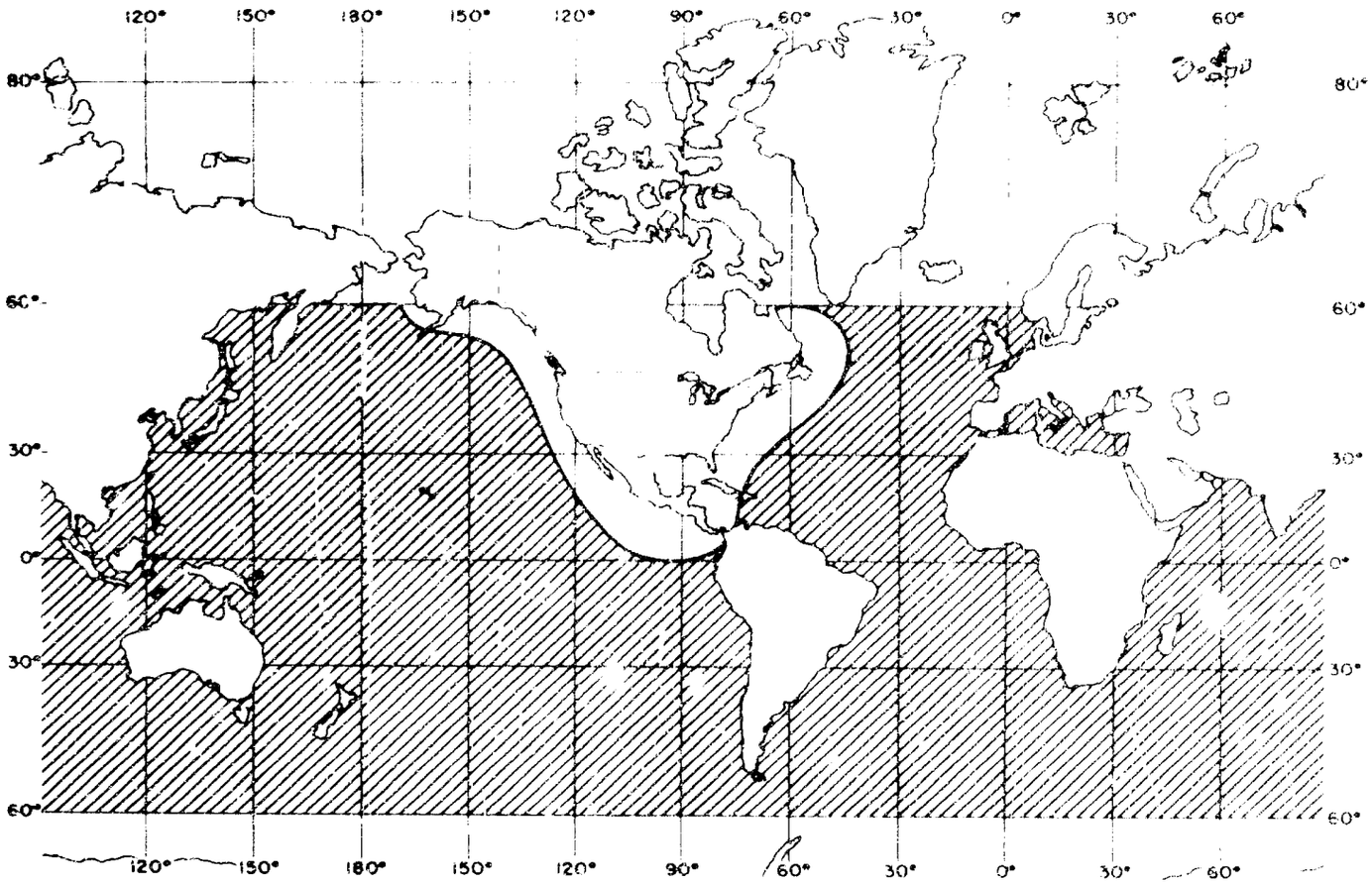
- Area – 3 Specified Sites about 1 mi. Off Shore from Vandenberg AFB
- X, Y Spacing – Sites are about 1/2 to 1 mi. Apart in a Line
- Total Observation Sites Required – 3



AMO #2B—USAF (AWS)—Support western missile test range and "WINDS"

Legend:

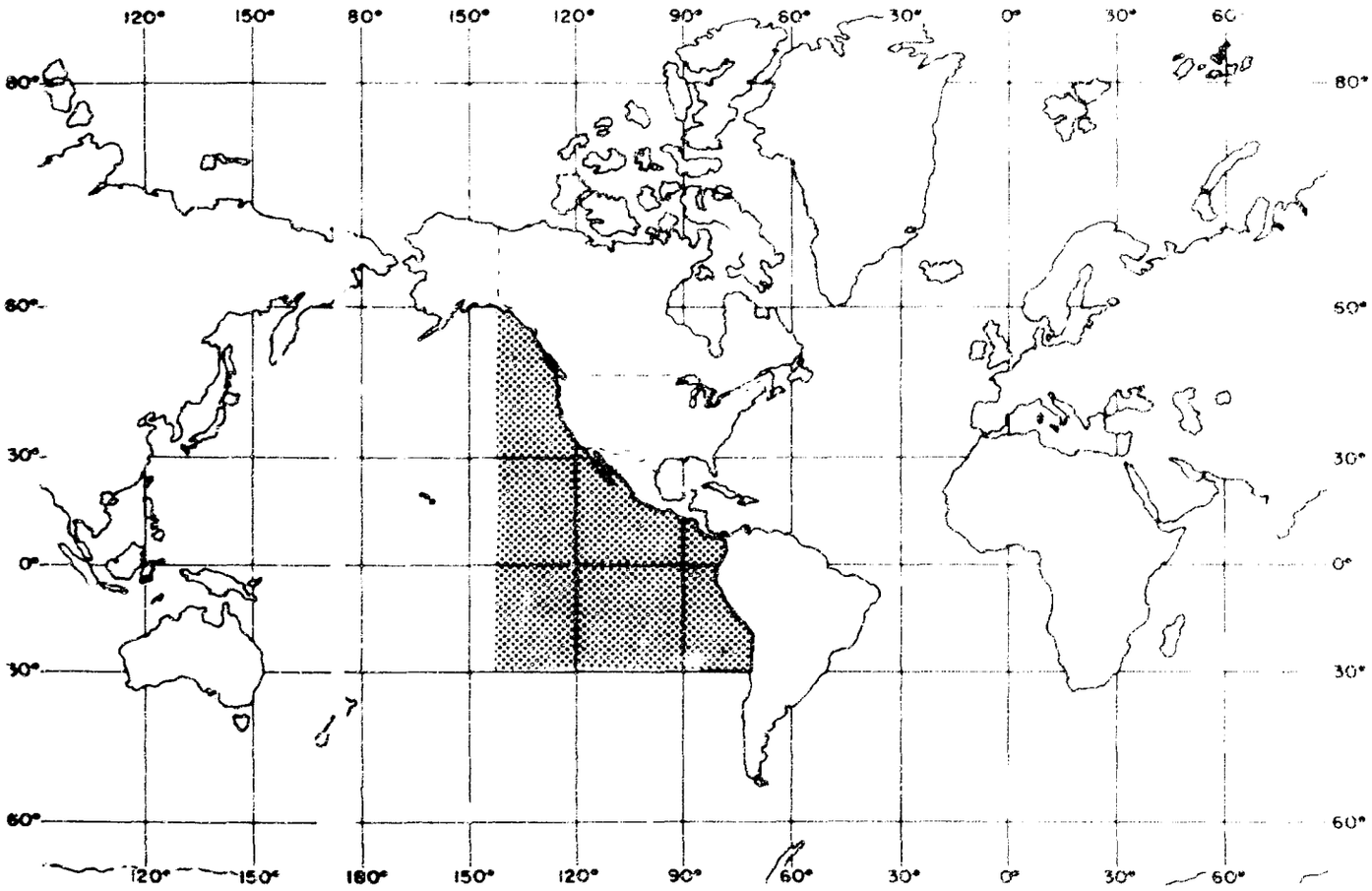
- Area = Global Deep Ocean
- X, Y Spacing = 600 n. mi.
- Total Observation Sites Required = 261



AMO #3—USAF (AWS)--Support global D.O.D. operations.

Legend:

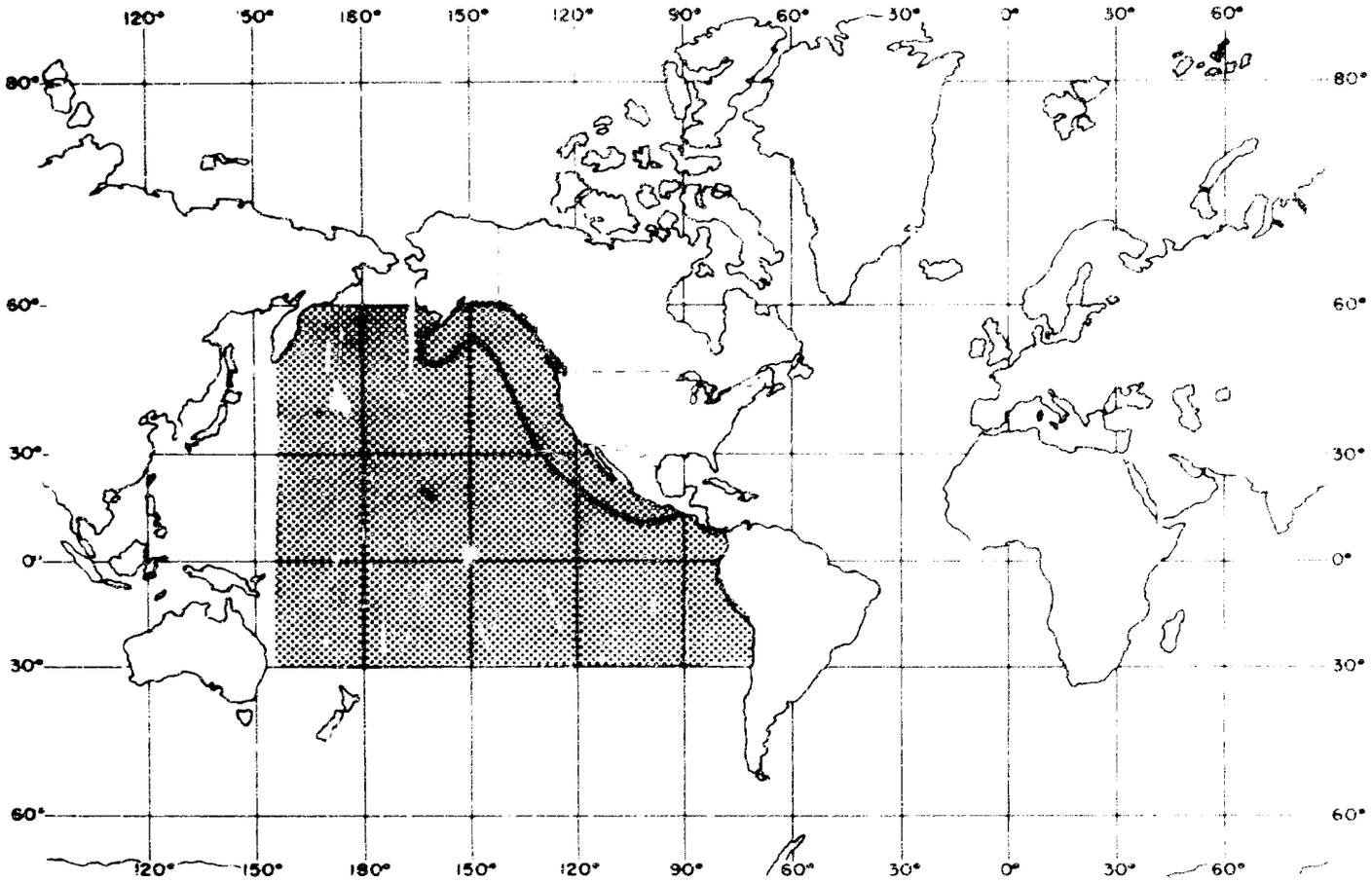
- Area = Pacific Coast to 140°W, 30°S to 60°N
- X, Y Spacings = 100 to 120 n. mi. ≤ 400 n. mi. from N. America
  500 to 600 n. mi. > 400 n. mi. from N. America
- Total Observation Sites Required = 186



AMO #14 –BCF, La Jolla—Distribution and environment of tuna, etc.

Legend:

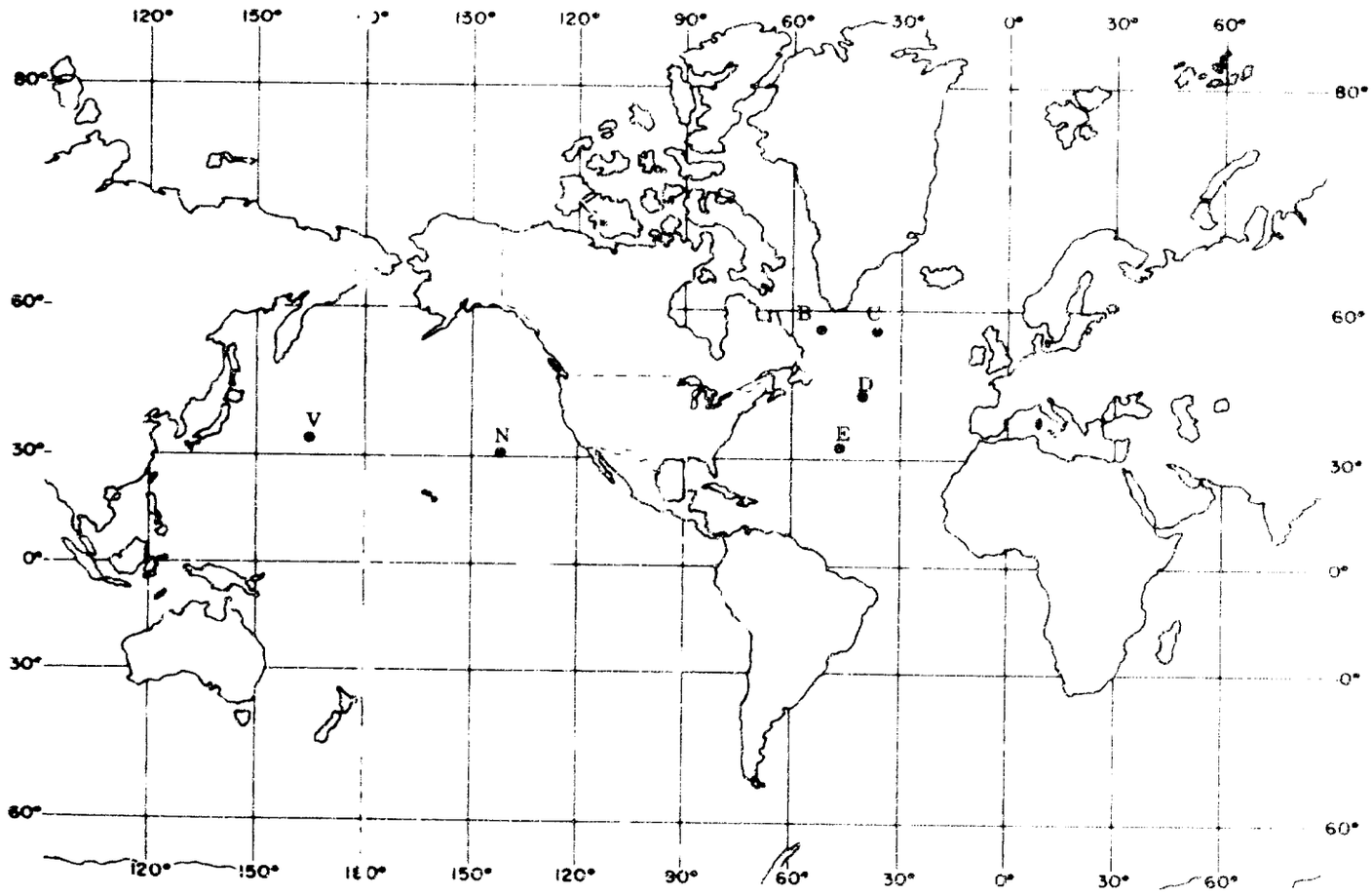
- Area = Pacific Coast to 160°E, 30°S to Alaska
- X, Y Spacings = 100 to 120 n. mi. < 400 n. mi. from N. America
  500 to 600 n. mi. > 400 n. mi. from N. America
- Total Observation Sites Required = 214



AMO #19—BCF, Washington, D.C.—Synoptic climatology.

Legend:

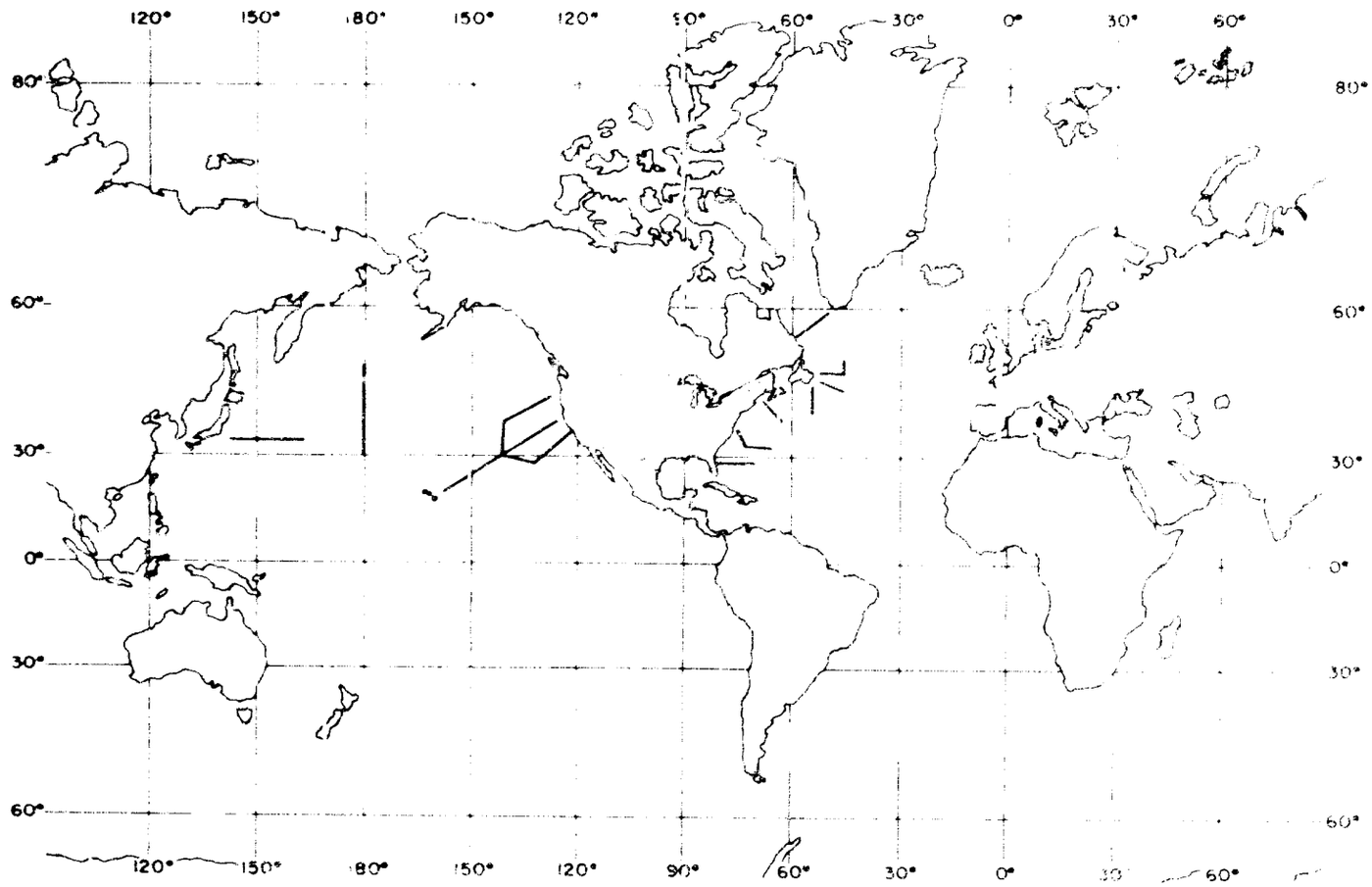
- Area = 4 OSVs in Atl . c and 2 in Pacific
- X, Y Spacing = N/A l gle Points)
- Total Observation Sit s Required = 6



AMO #23—USCG—Ocean station vessels.

Legend:

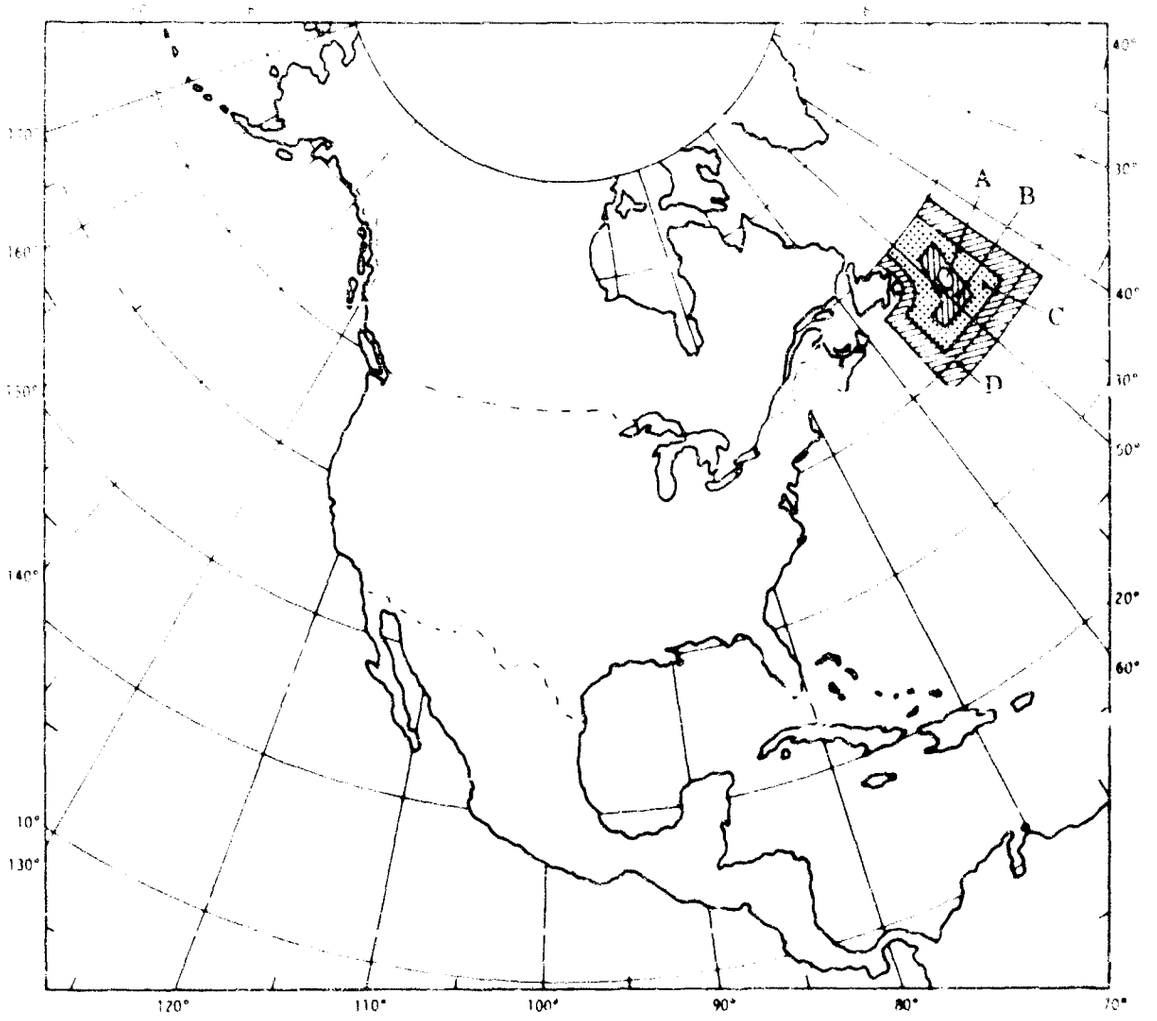
- Area = 7 Tracks in Atlantic and 6 in Pacific
- X, Y Spacing = 1 to 25 n. mi. ≤ 300 n. mi. from N. America
  25 to 60 n. mi. > 300 n. mi. from N. America
- Total Observation Sites Required = 227



AMO #24—USCG—Data acquisition along standard sections.

Legend:

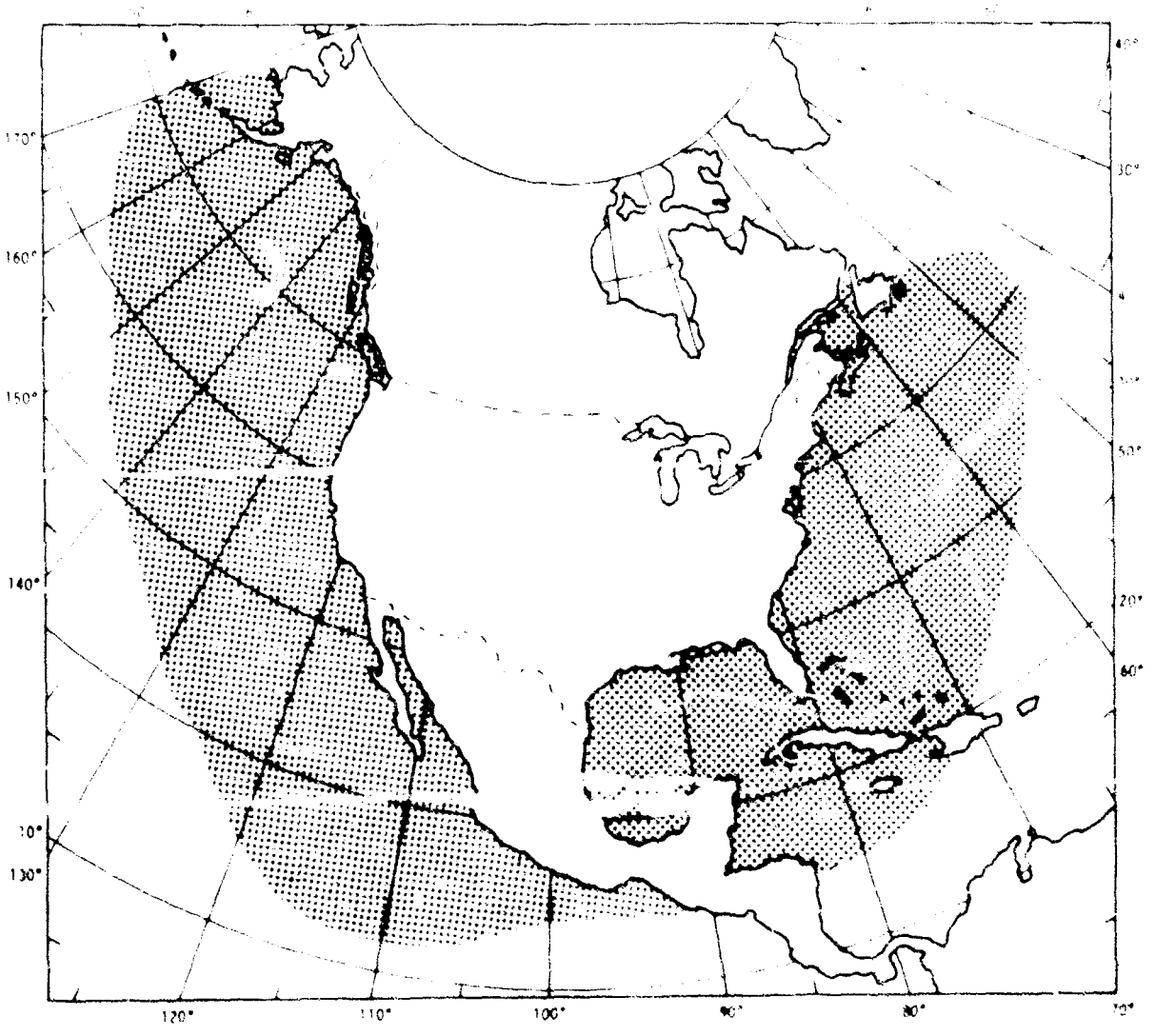
- Area Grand Banks
- X, Y Spacing A. 7 Locations near 44°N, 48°W for continuous 6 hrly synoptic obs
  B. 10 n. mi in X 50 n. mi. in Y
  C. 30 n. mi. in X, 50 n. mi. in Y
  D. 100 n. mi. in X, 100 n. mi. in Y
- Total Observation Sites Required 297



AMO #25—USCG—Ice patrol monitoring.

Legend:

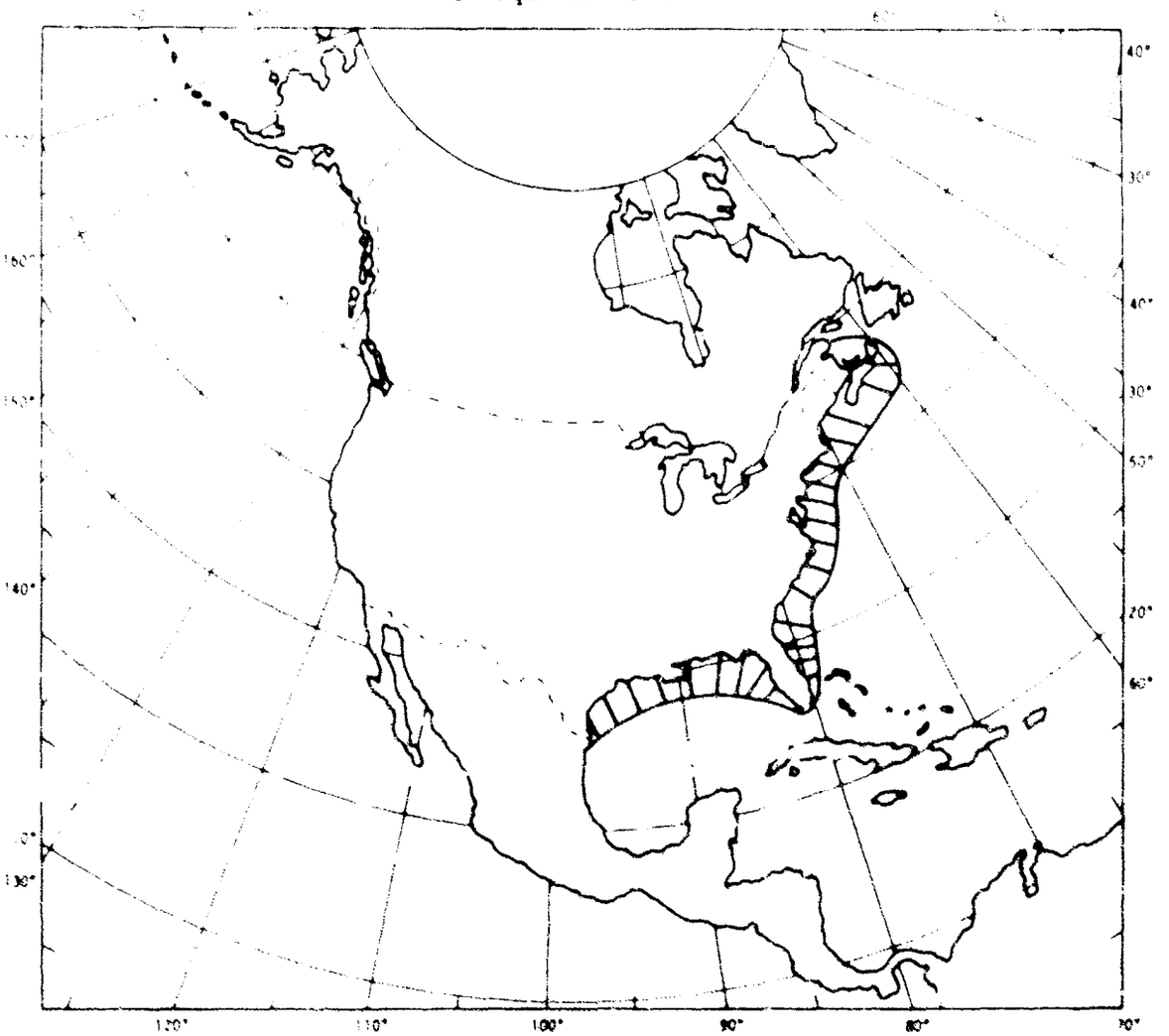
- Area Ocean Areas Contiguous to the U. S. (Area Not Clearly Defined)
- X, Y Spacing Varies with Operation
- Total Observation Sites Required Unknown



AMO #27—USCG—Search and rescue.

Legend:

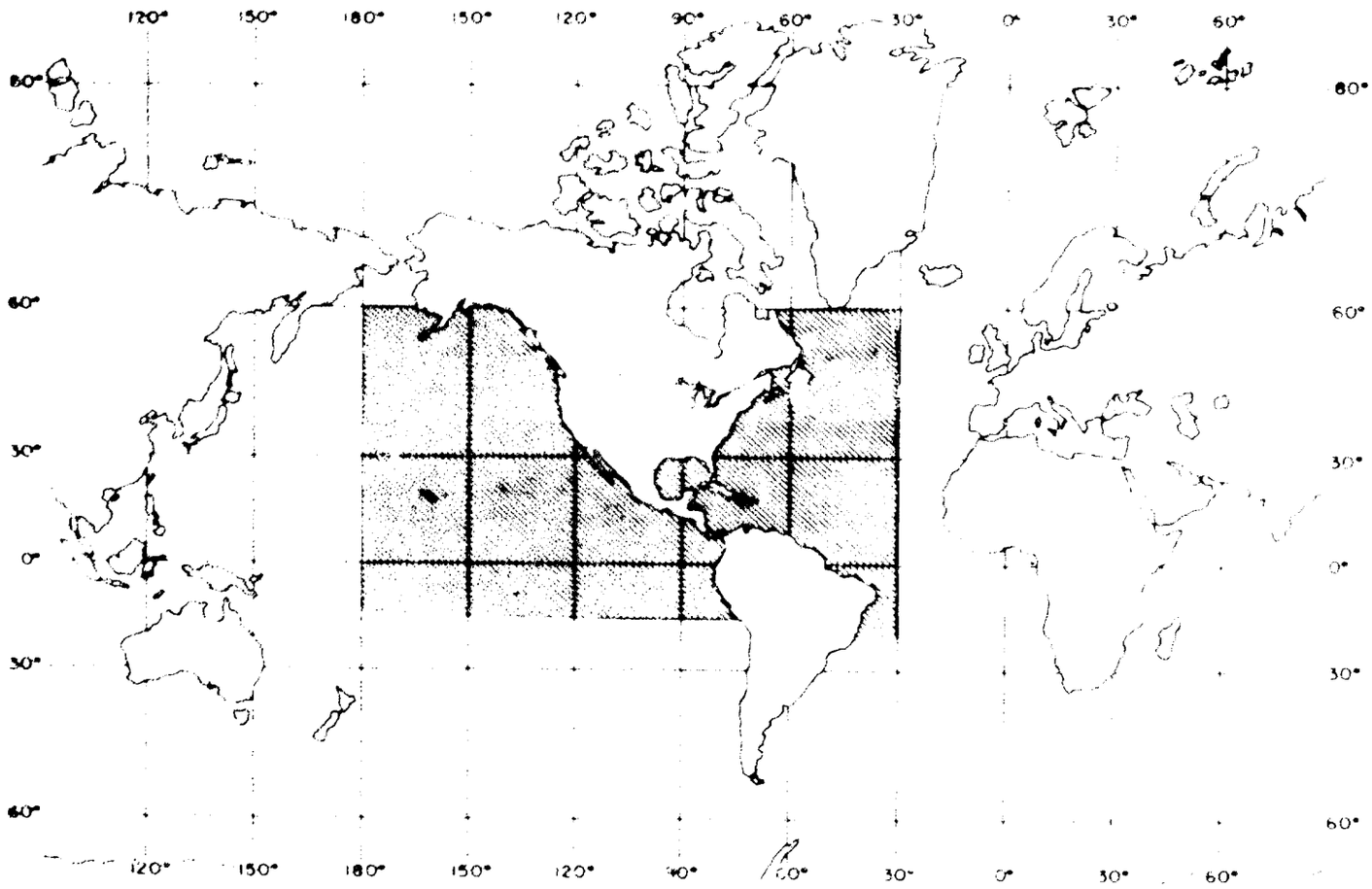
- Area Cont. Shelf of U.S. and Canada
- X, Y Spacing Lines with Sites at 10, 20, 30, 50, 70 + 100 Fathoms and lines are about 100 n. mi. apart
- Total Observation Sites Required 144



AMO #28A—USCG—Coastal Oceanographic Services (weather net).

Legend:

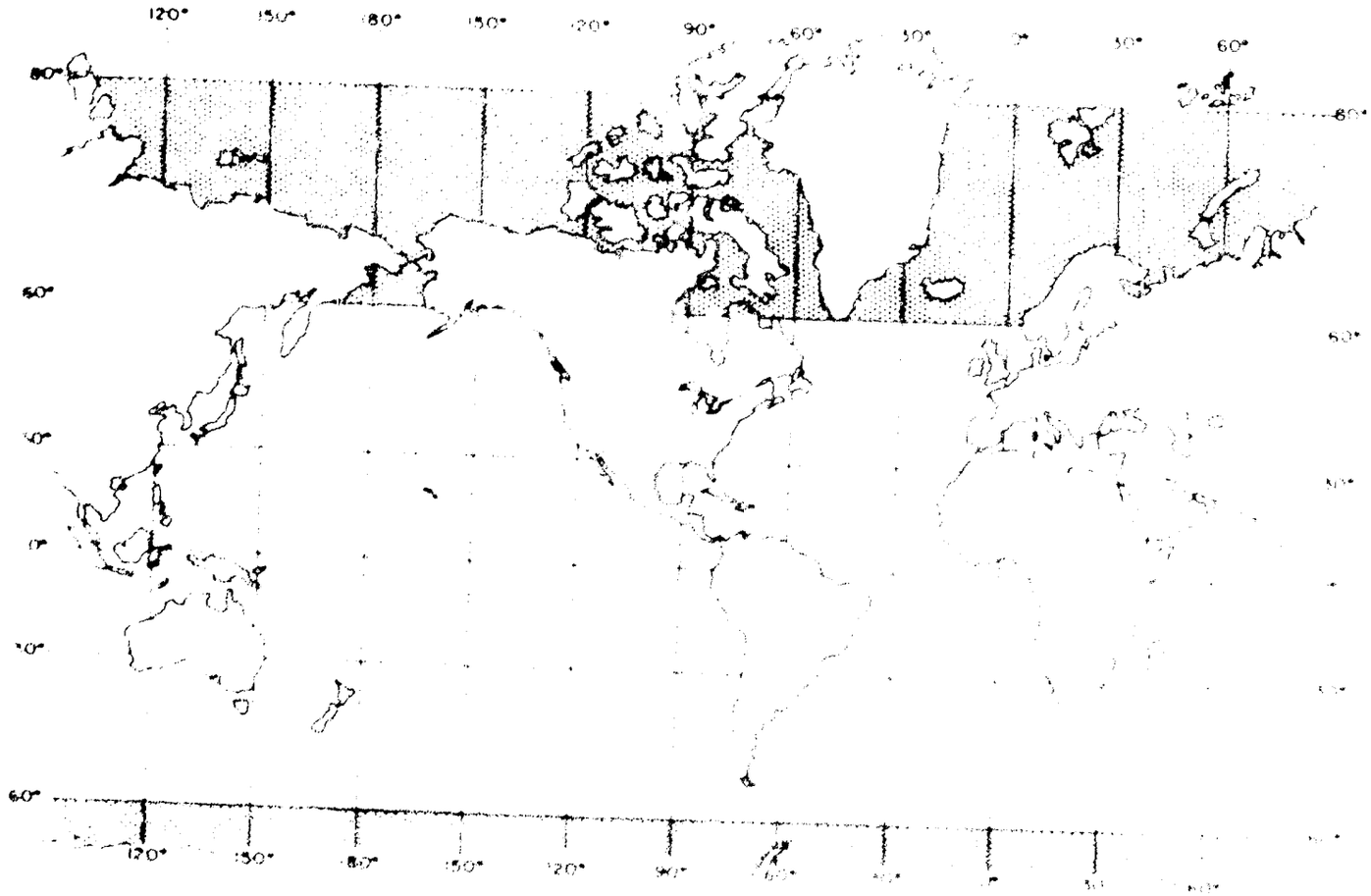
- Area W. Atlantic N of 20°S and E. Pacific N of 15°S
- X, Y Spacing Variable Lines with Sites 10 to 40 n. mi. Apart in the Lines
  The lines are 200 to 500 n. mi. Apart
- Total Observation Sites Required Unknown



AMO # 28B – USCG – Oceanographic services (ocean surveys).

Legend:

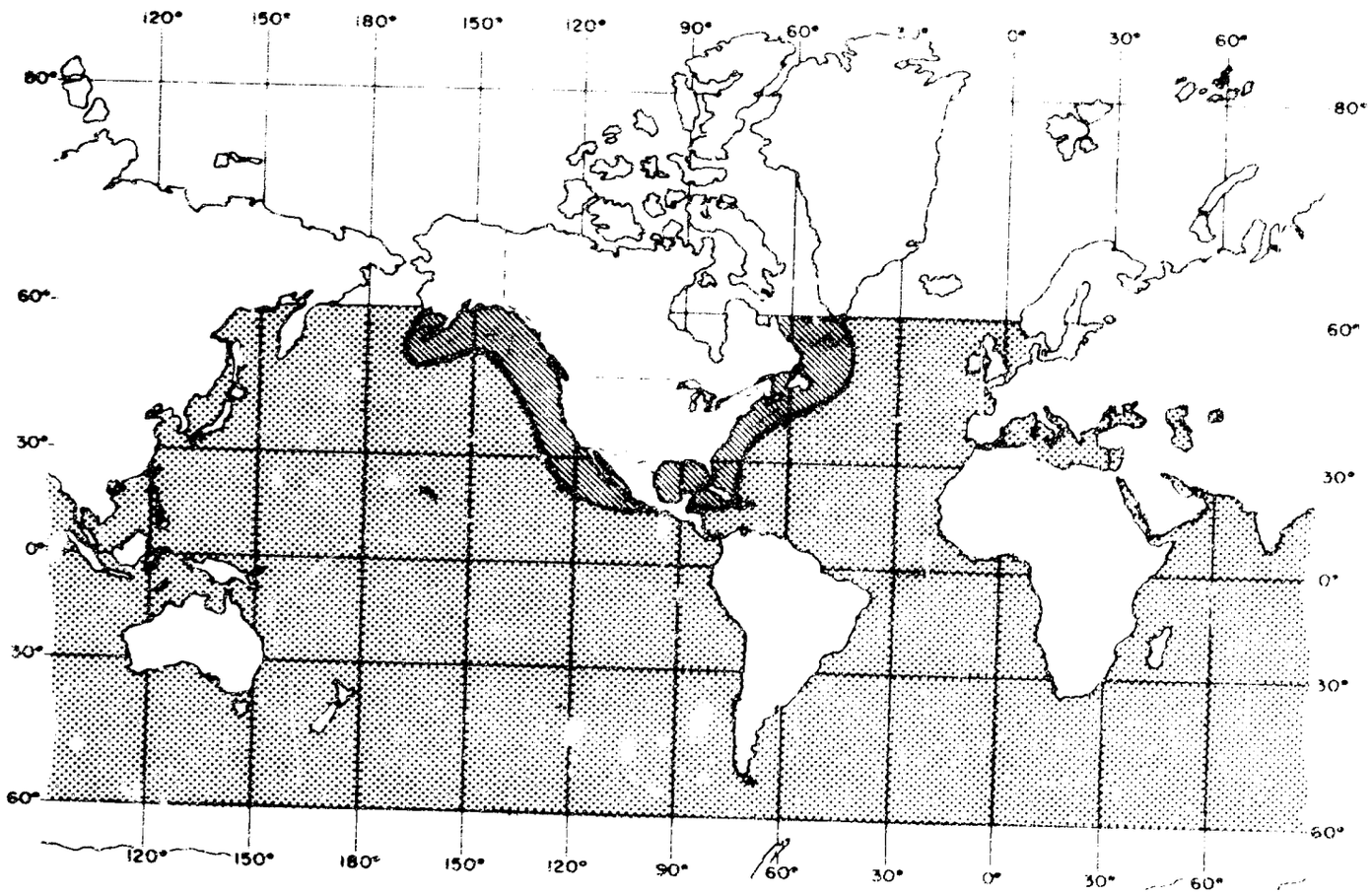
- Area – Arctic and Antarctic (Above 60°N, below 60°S)
- X, Y Spacing – *Not Stated*
- Total Observation Sites Required – Unknown (Goals are not only for totalities in terms



AMO #29 – USCG – for harvesting and polar oceanographic

Legend

- Area = Global Deep Ocean and Coastal North America
- X, Y Spacing = 300 to 600 n. mi. (DO), 60 to 150 n. mi. (CNA)
- Total Observation Sites Required = 540 (261-DO, 279-CNA)



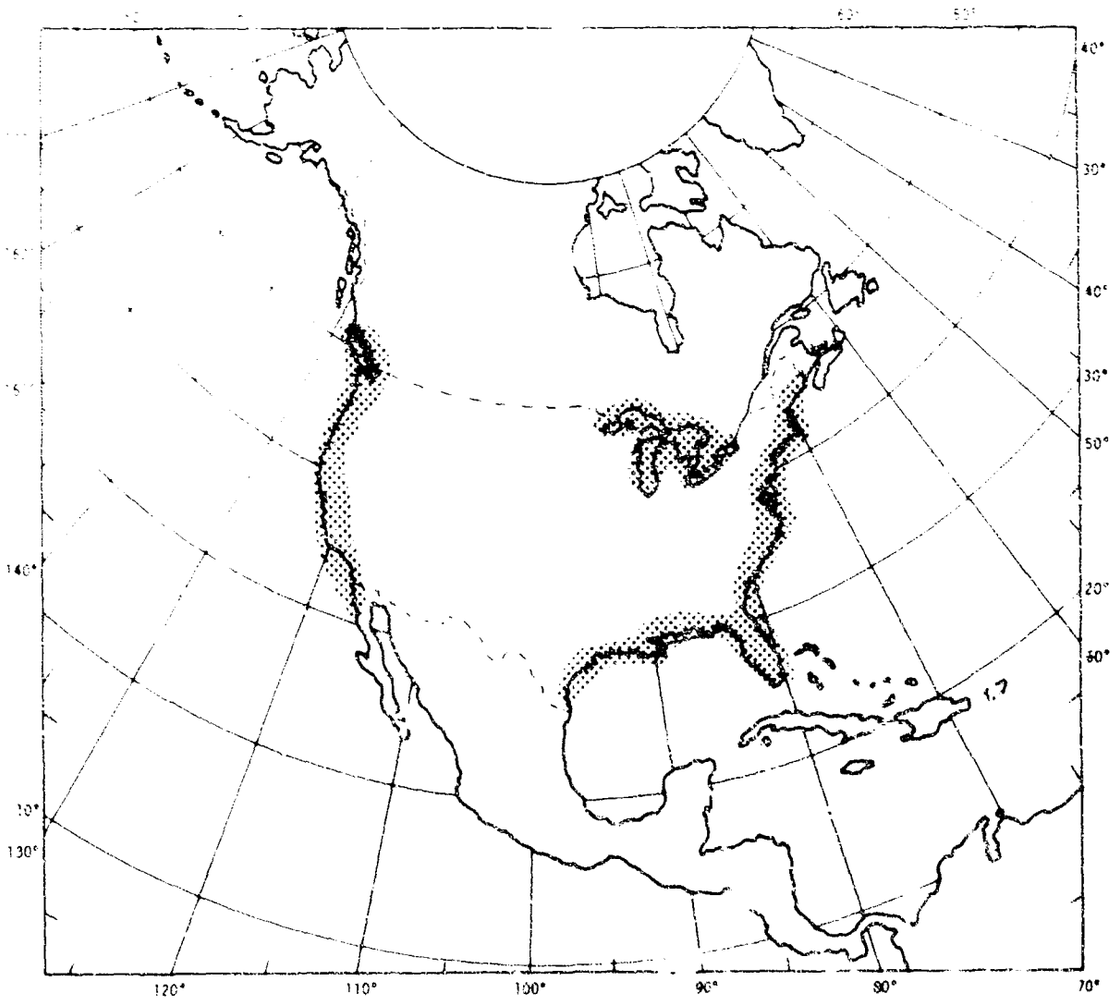
AMO #30--35—ESSA—Total agency requirements

X, Y = 60 to 150 n. mi. = 400 n. mi. from N. A. Coast,

X, Y = 300 to 600 n. mi. global deep ocean 60°N to 60°S.

Legend:

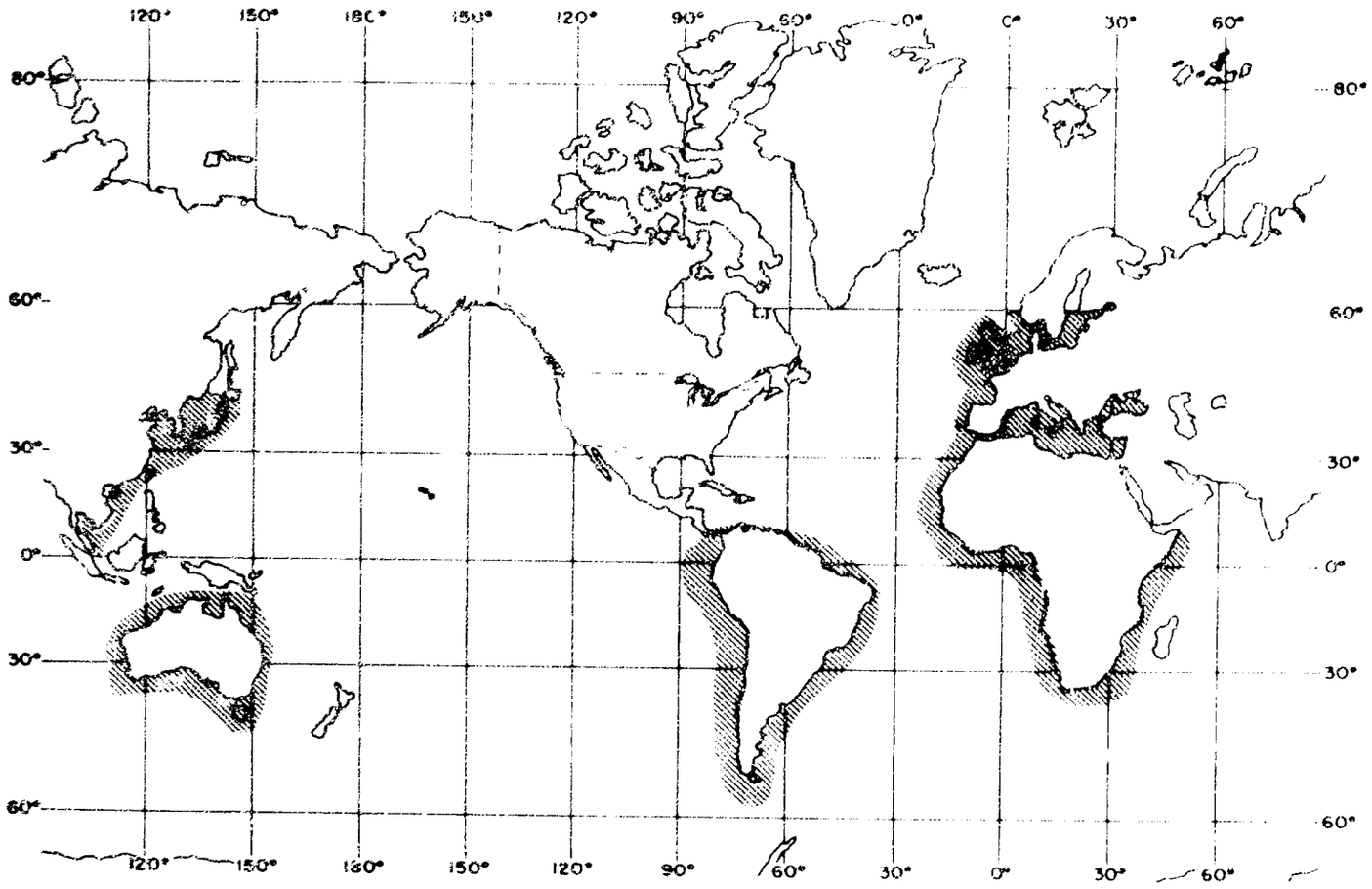
- Area = Great Lakes, Estuaries and Near Shore Areas of U. S.
- X, Y Spacing = 20 n. mi. and 0.1 n. mi. in Special Areas of Great Lakes
  1 to 10 n. mi. in Estuaries and Near Shore
- Total Observation Sites Required = 800 (Estimated)



AMO #39—FWPCA, U.S. Dept. of Interior—determine water quality.

Legend:

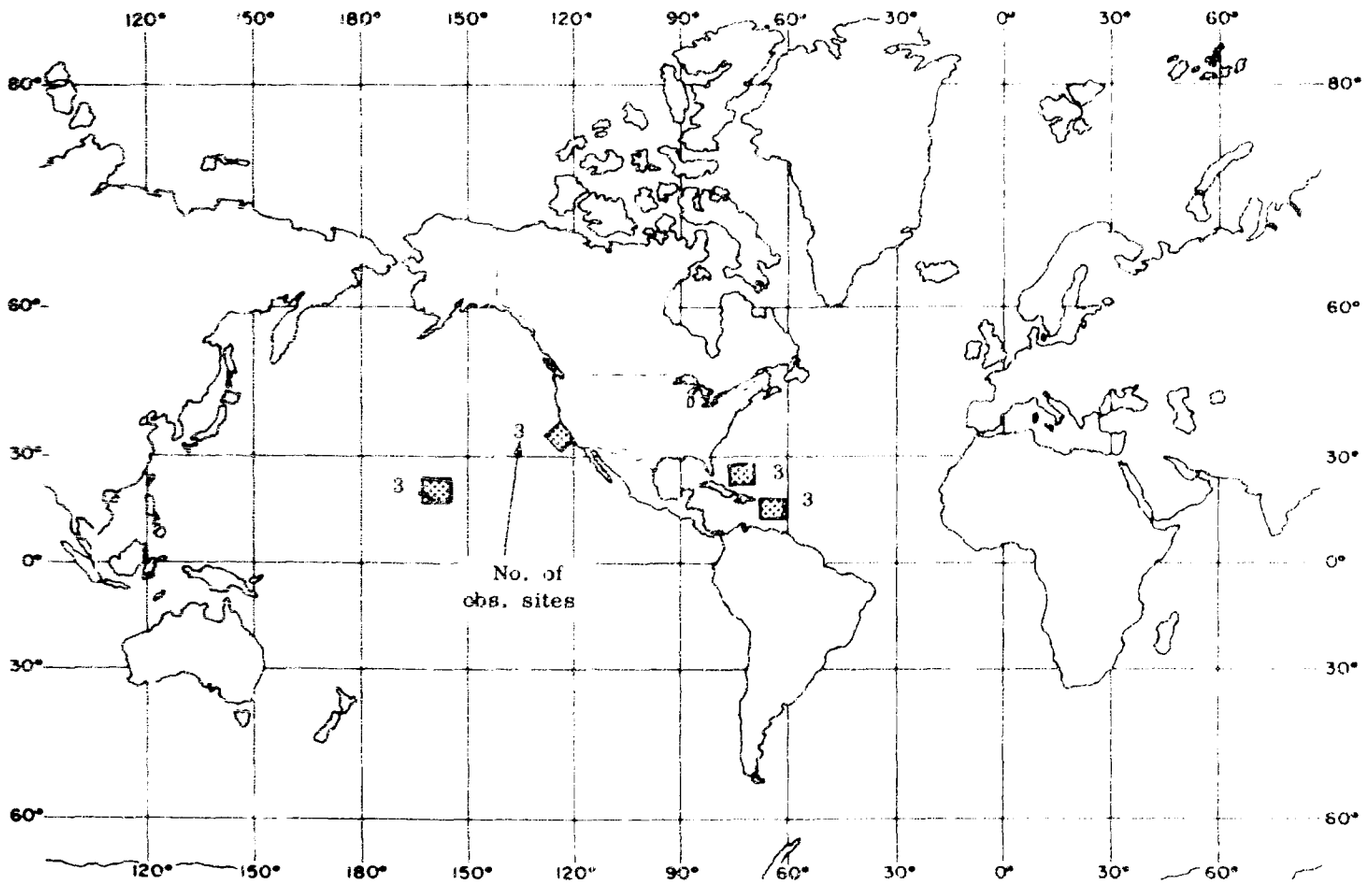
- Area = Out to 400 Fathoms Depth from SE Asia, S. America, Africa, Europe and Australia
- X, Y Spacing = N/A (Single pts)
- Total Observation Sites Required = Unknown



AMO #67—NOO—Code 80, Inshore Surveys—Measure depth of water to 400 fathoms.

Legend:

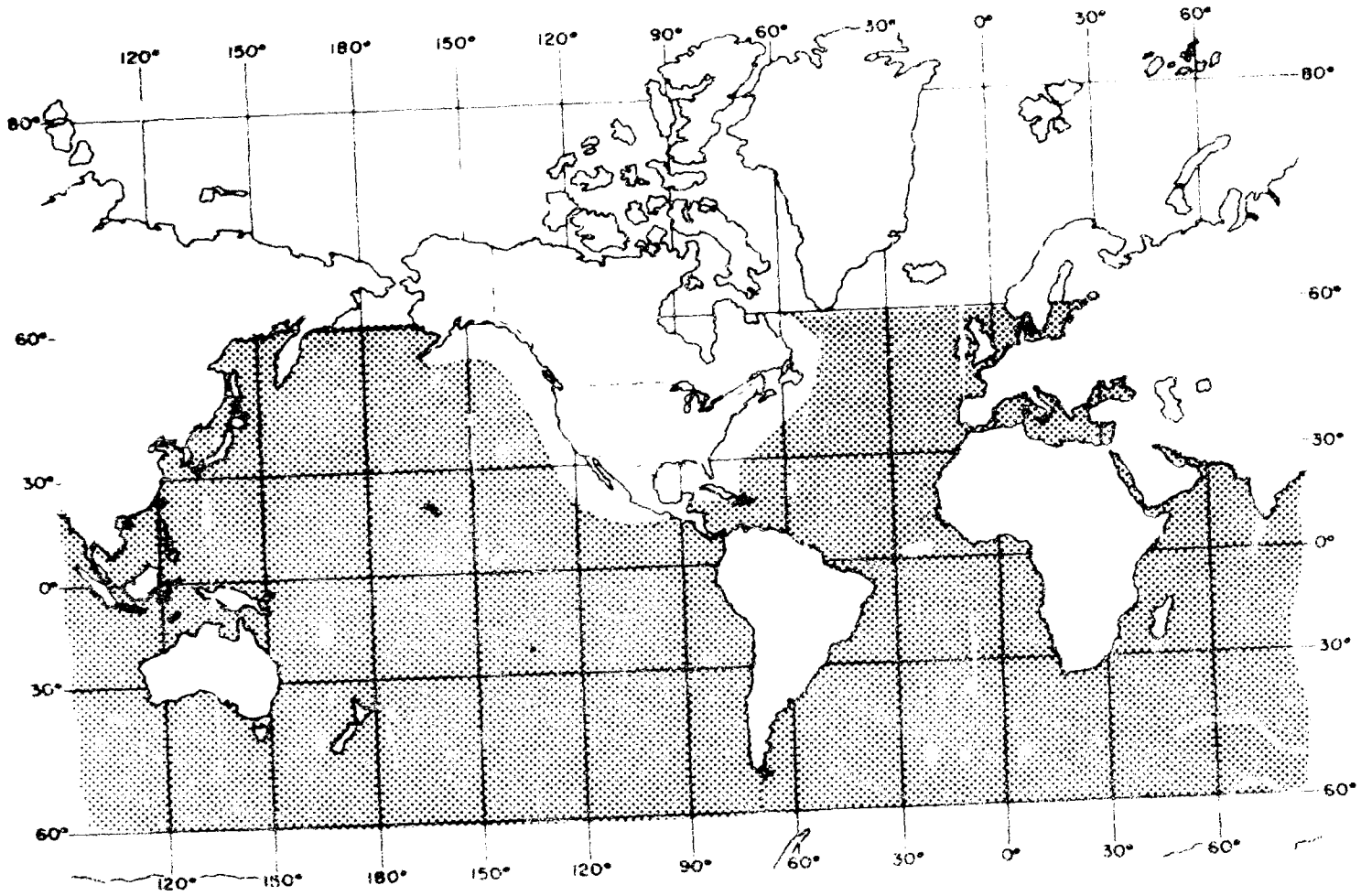
- Area = 2 Test Ranges in Atlantic and 2 in Pacific
- X, Y Spacing = 3 Sites 10 n. mi. Apart Within 20 n. mi. of Island in each Range
- Total Observation Sites Required = 12



AMO #68—NOO-Code 90—Underwater environmental monitoring for test ranges.

Legend:

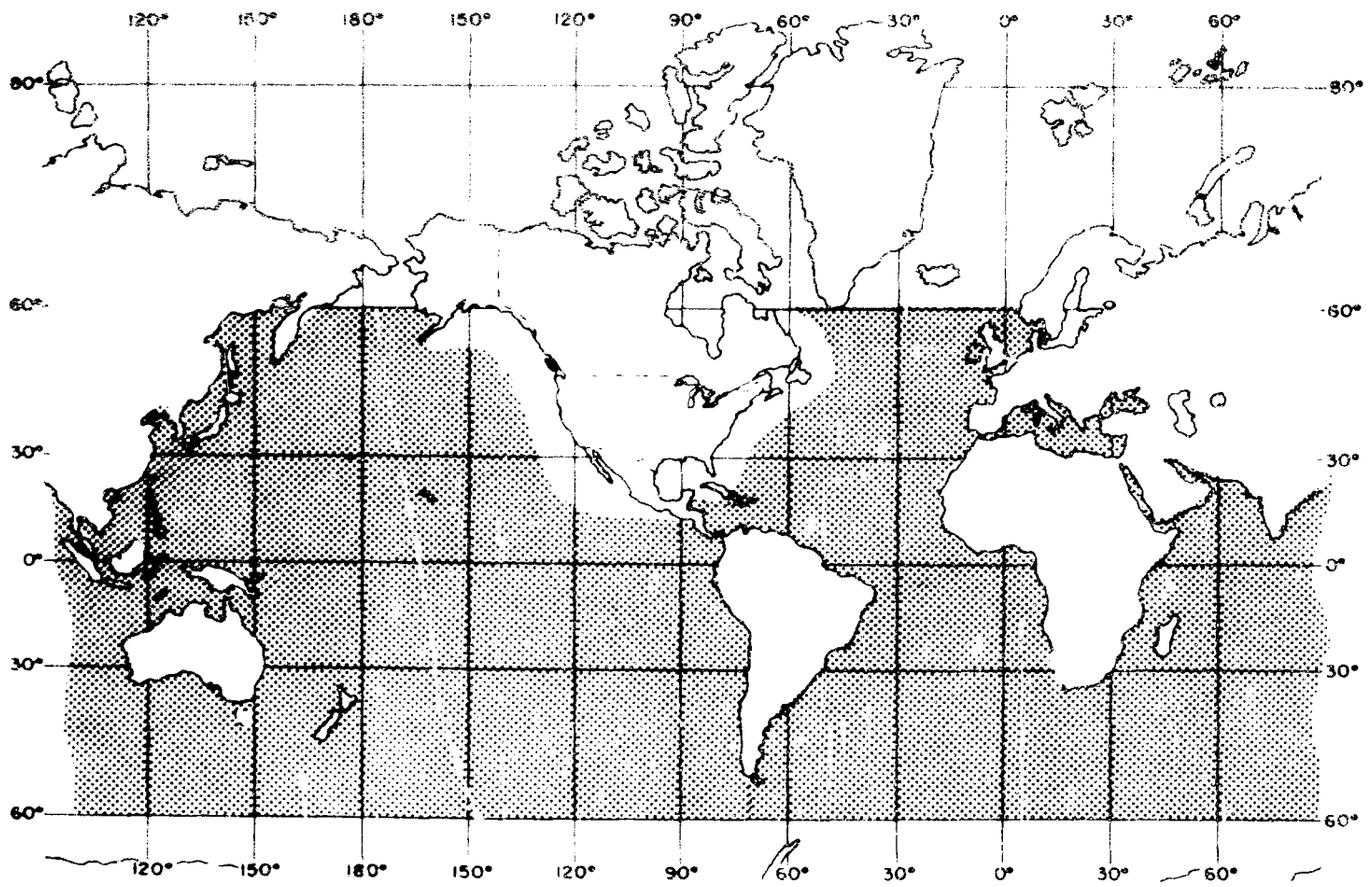
- Area = Global Deep Ocean
- X, Y Spacing = 1 Site at a Time or Unknown
- Total Observation Sites Required = Unknown



AMO #69—NOO-Code 90—World ocean surveys.

Legend:

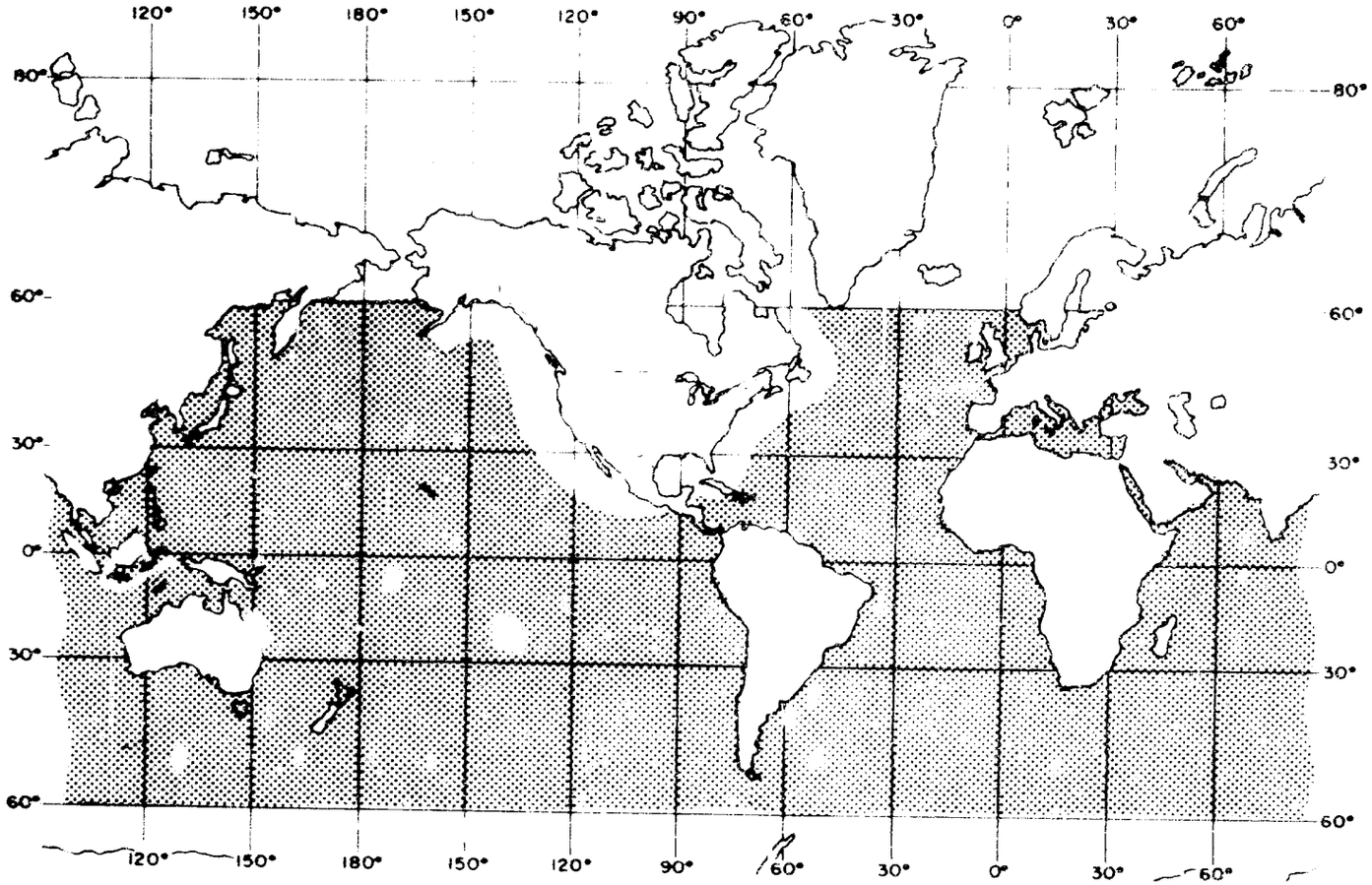
- Area = Global Deep Ocean
- X, Y Spacing = 600 n. mi.
- Total Observation Sites Required = 261



AMO #1—USN (NWS)—Support airborne operations.

Legend:

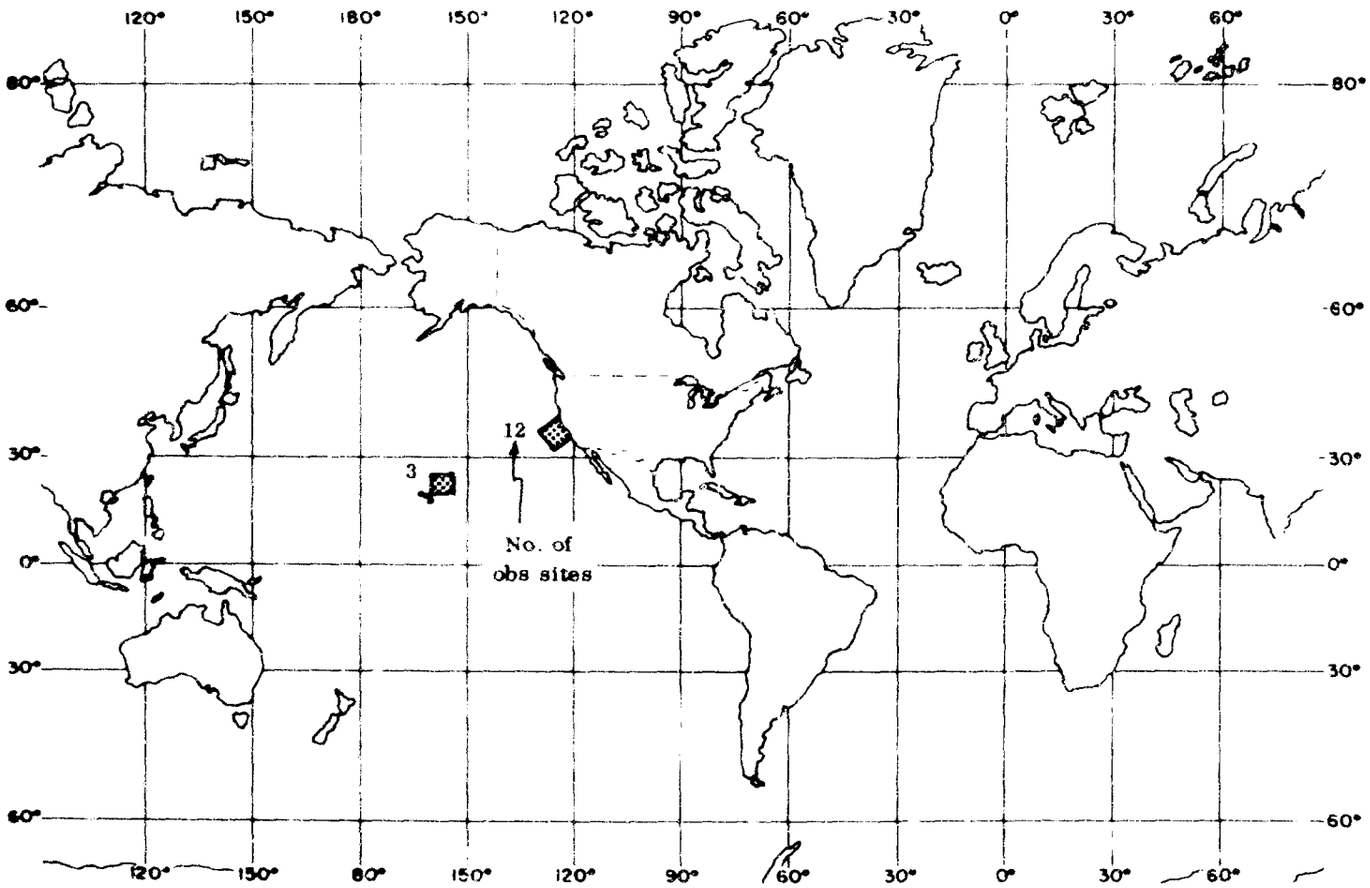
- Area = Global Deep Ocean
- X, Y Spacing = 600 n. mi.
- Total Observations Required = 261



AMO #72—US (NWS)—Support water surface and subsurface operations.

Legend:

- Area = 2 Ranges in Pacific
- X, Y Spacing = 25 to 50 n. mi.
- Total Observation Sites Required = 15

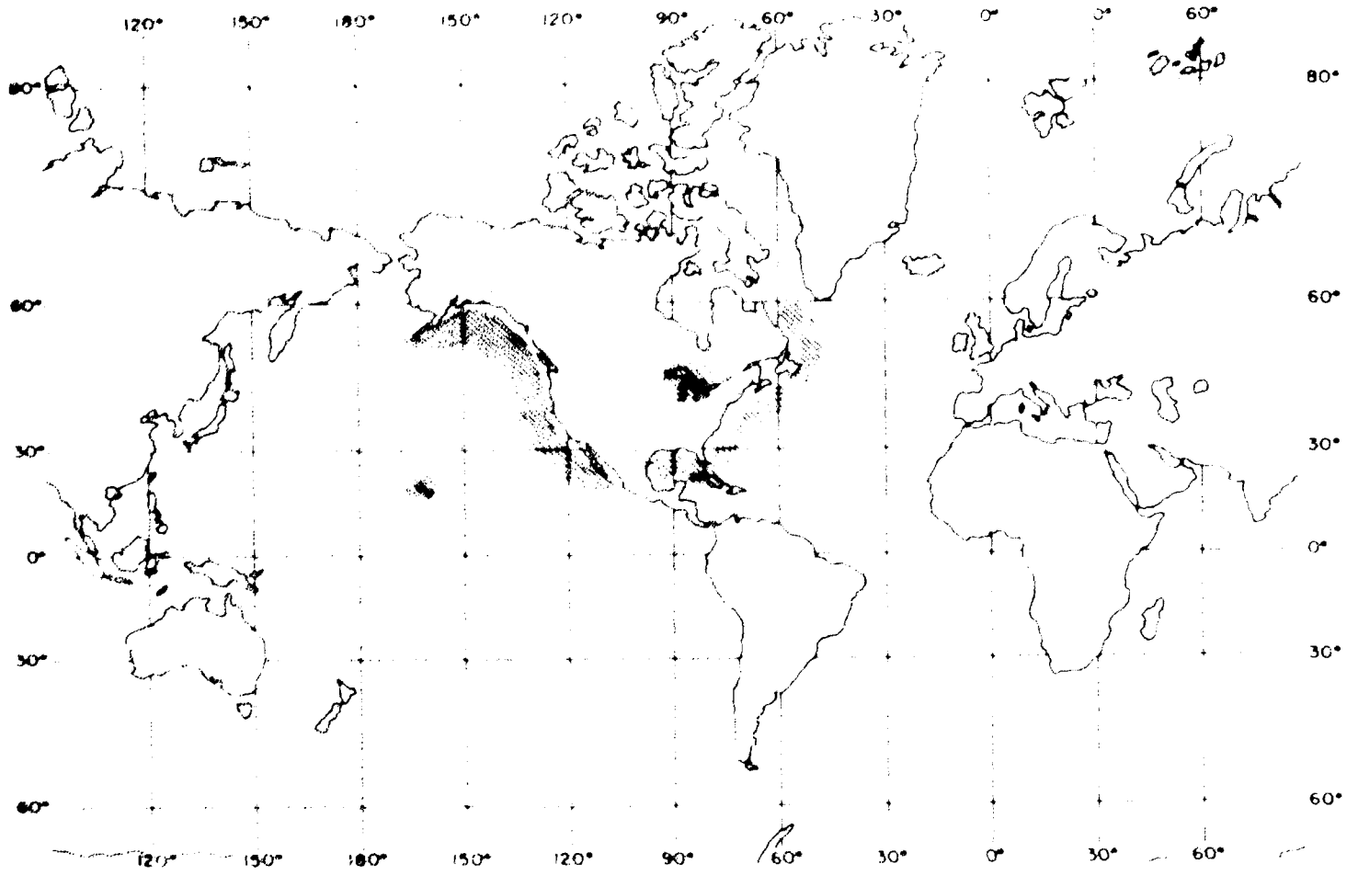


AMO #73—USN, Pacific Missile Range—Support range with environmental data.

APPENDIX III, PART B. GEOGRAPHICAL AREAS AND REQUIRED NUMBER OF OBSERVATION SITES FOR RESEARCH AMOs

Legend:

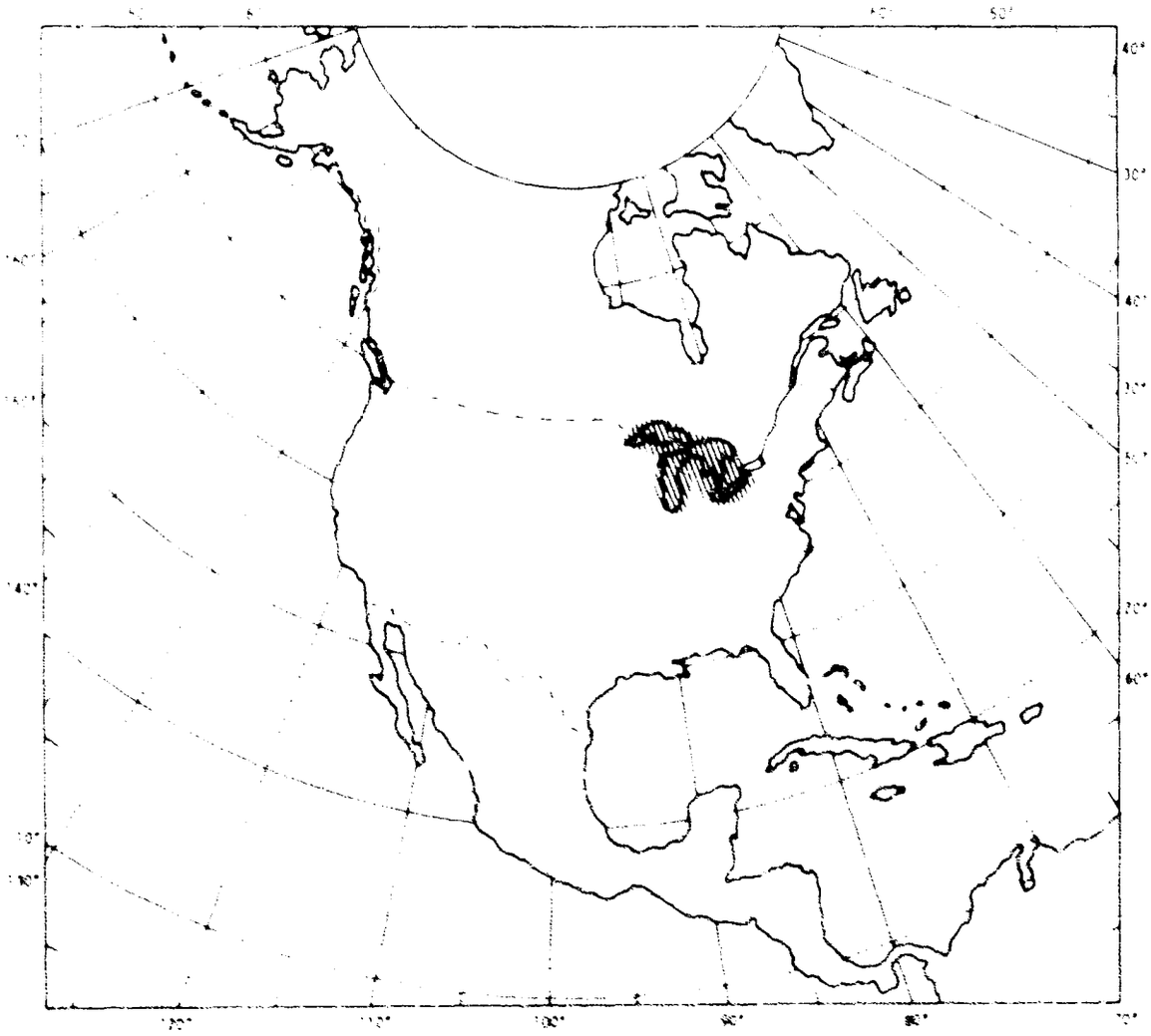
- Area - North American Coast, Hawaii and Great Lakes Where Depth ≤ 125 m
- X, Y Spacing = 500 n. mi.
- Total Observation Sites Required = 24



AMC #5—U.S. Army, Coastal Engineering Research Center—Research in coastal engineering.

Legend:

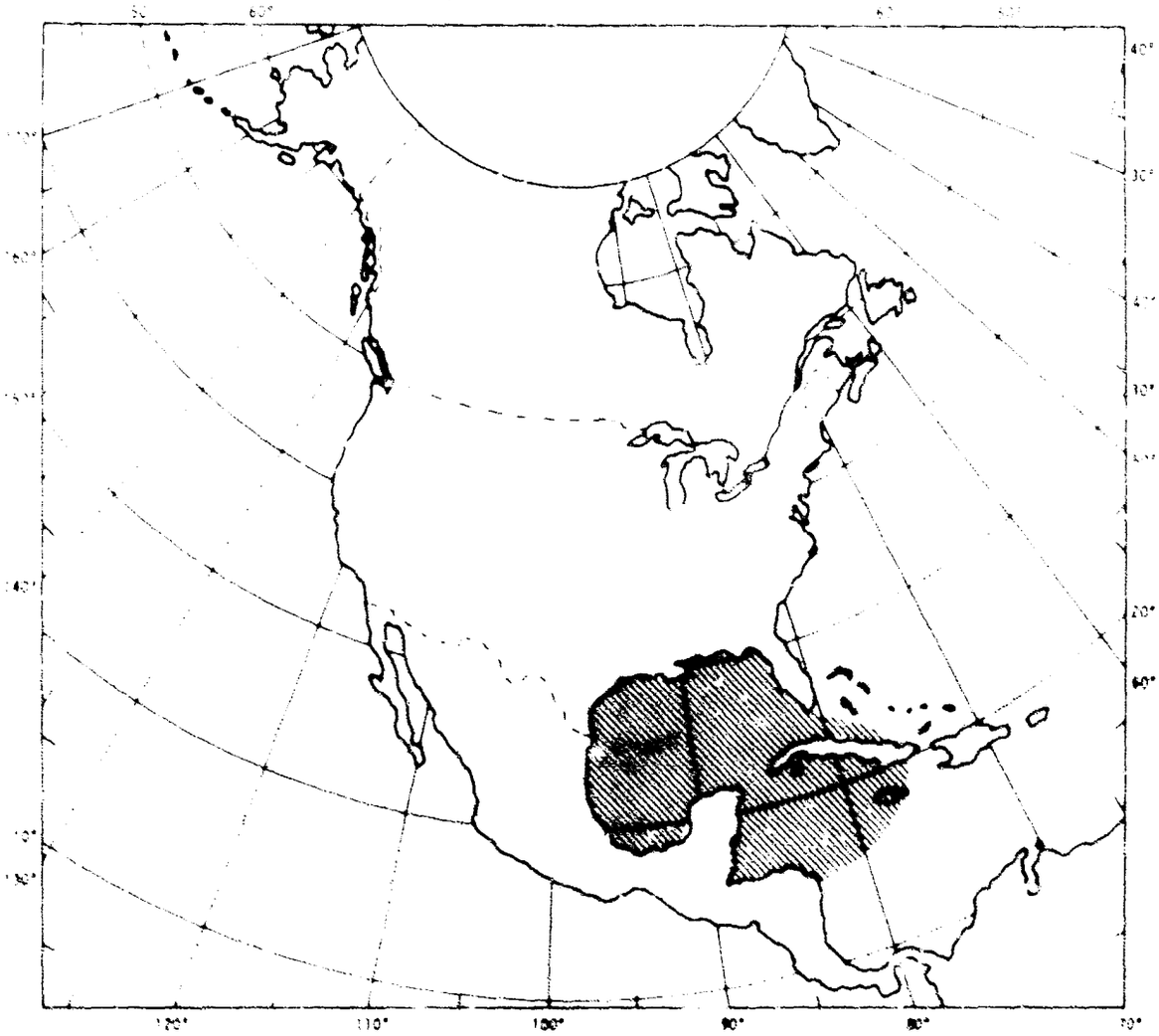
- Area = Great Lakes
- X, Y Spacing = 27.5 n. mi.
- Total Observation Sites Required = 250



AMO #6--U.S. Army, Lake Survey--Water motion research in the Great Lakes.

Legend:

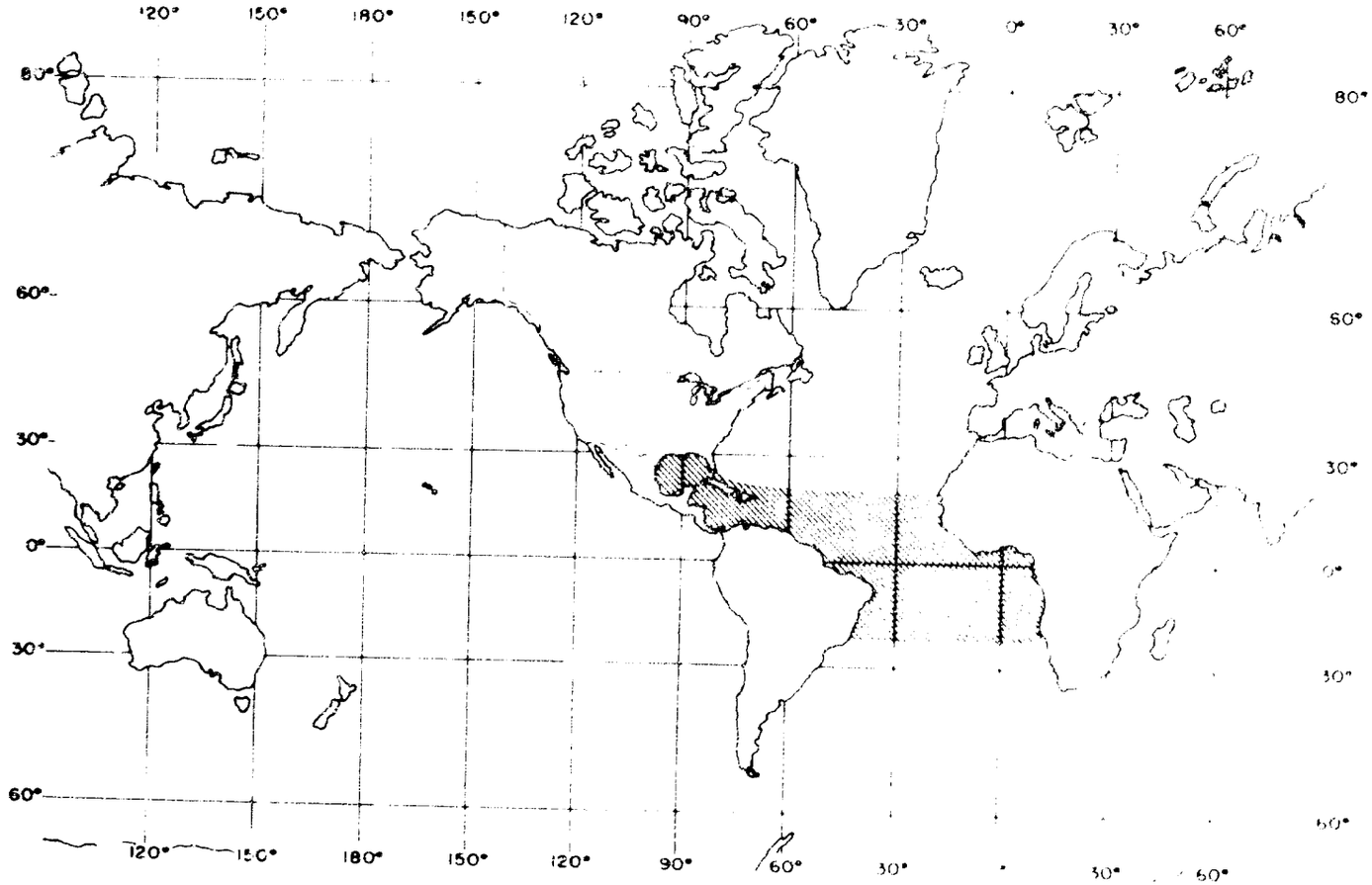
- Area = Gulf of Mexico and Caribbean
- X, Y Spacing = 10 n. mi. Near Shore, 50 n. mi. Off Shore and 100 n. mi. in Deep Water
- Total Observation Sites Required = 244



AMO #8—BCF, Galveston—Research on water masses.

Legend:

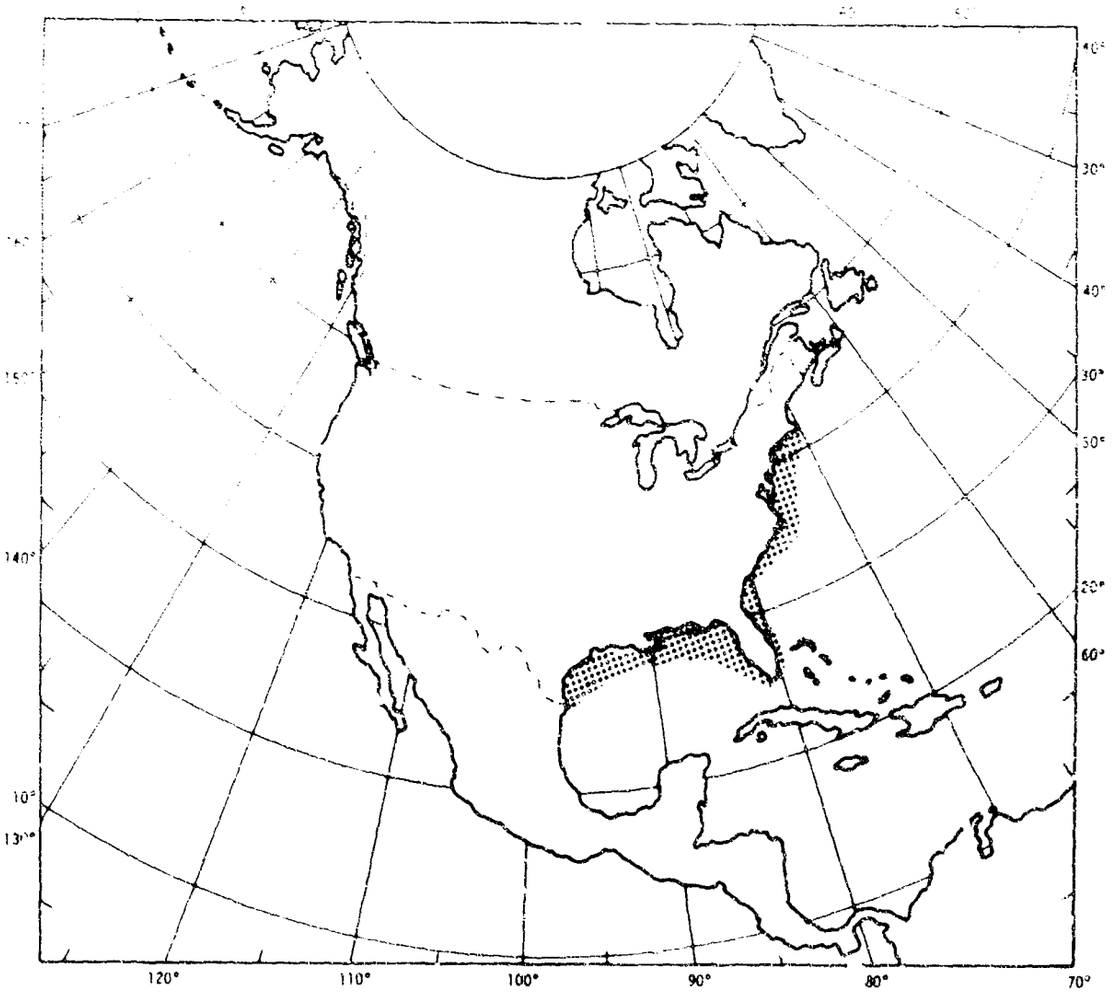
- Area = Tropical Atlantic 20° N to 20° S and Gulf of Mexico
- X, Y Spacing = A) 500 n. mi. Outside Areas of Special Interest
  B) 6 to 30 n. mi. in Areas of Special Interest
- Total Observation Sites Required = 80



AMO #9—BCF, Miami—Research on tuna.

Legend:

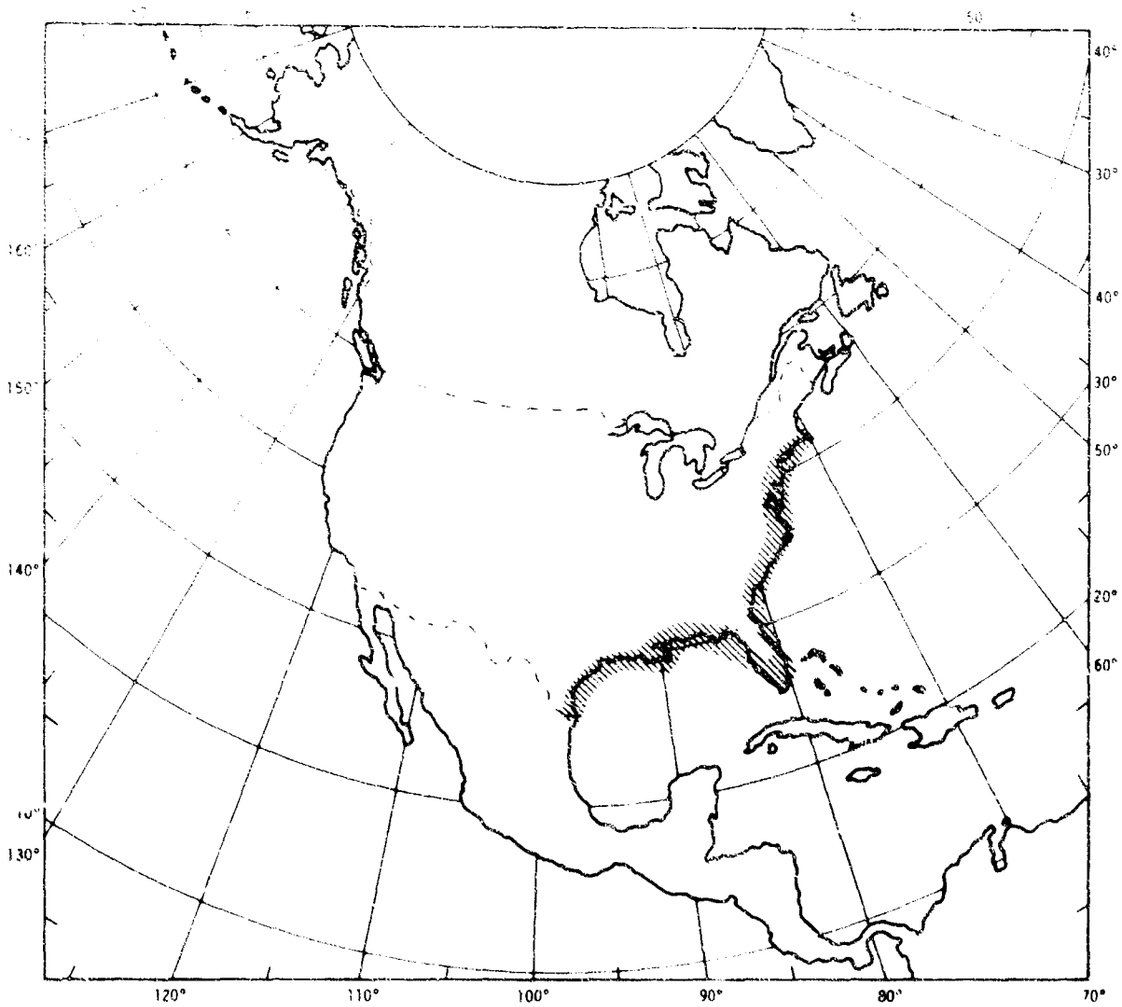
- Area = Cont. Shelf Maine to Texas out to a Maximum of 200 m
- X, Y Spacing = 100 n. mi.
- Total Observation Sites Required = 42



AMO 410 BCF, Beaufort, N. C.—Research on menhaden and blue crab.

Legend:

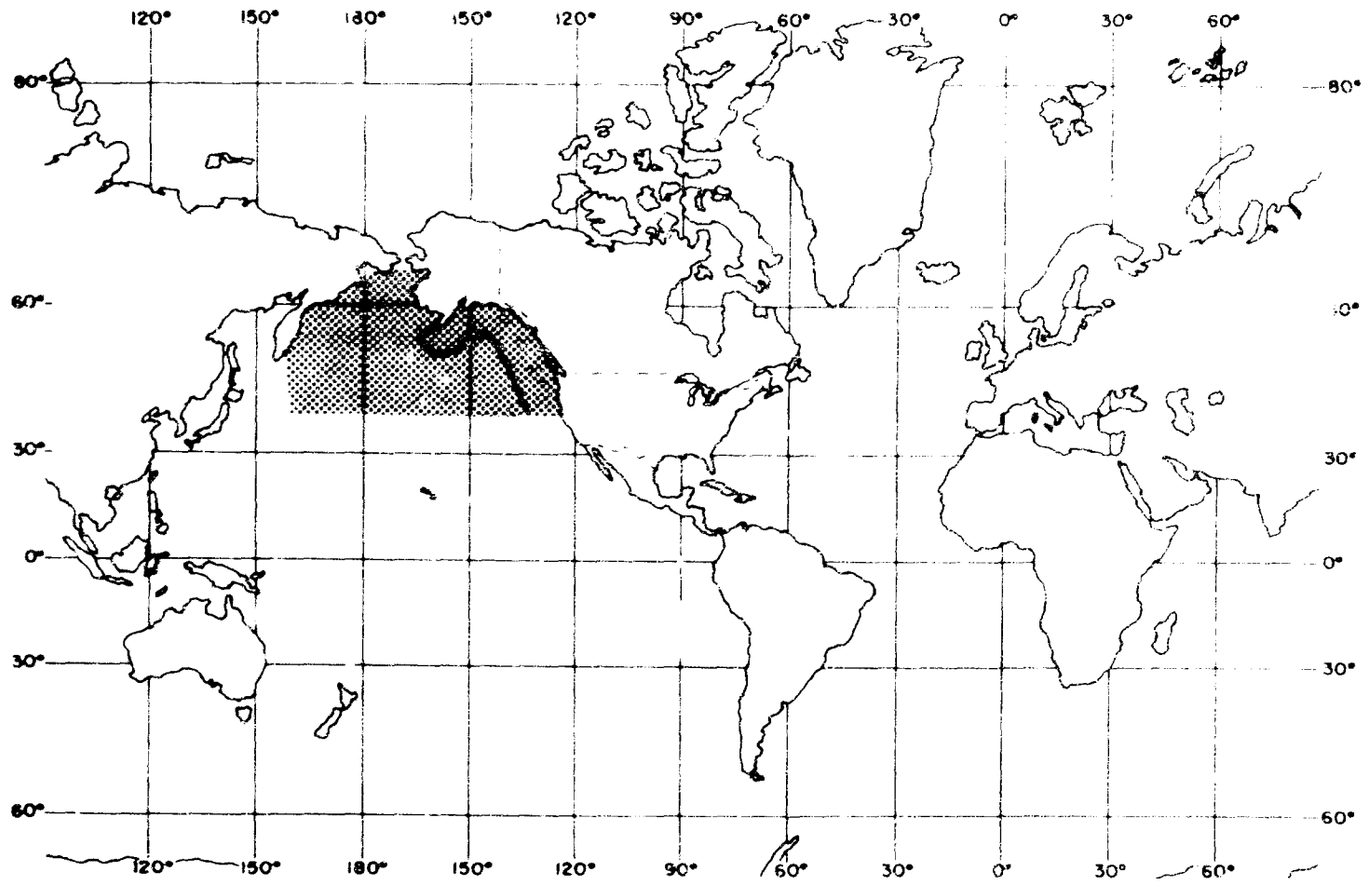
- Area = Estuaries and Near Shore Areas Cape Cod to Texas
- X, Y Spacing = Will Vary with Areas of Interest. At Present Limits Are Not Known
- Total Observation Sites Required = Unknown



AMO #11—BCF, Beaufort, N. C.—Research on menhaden and blue crab.

Legend:

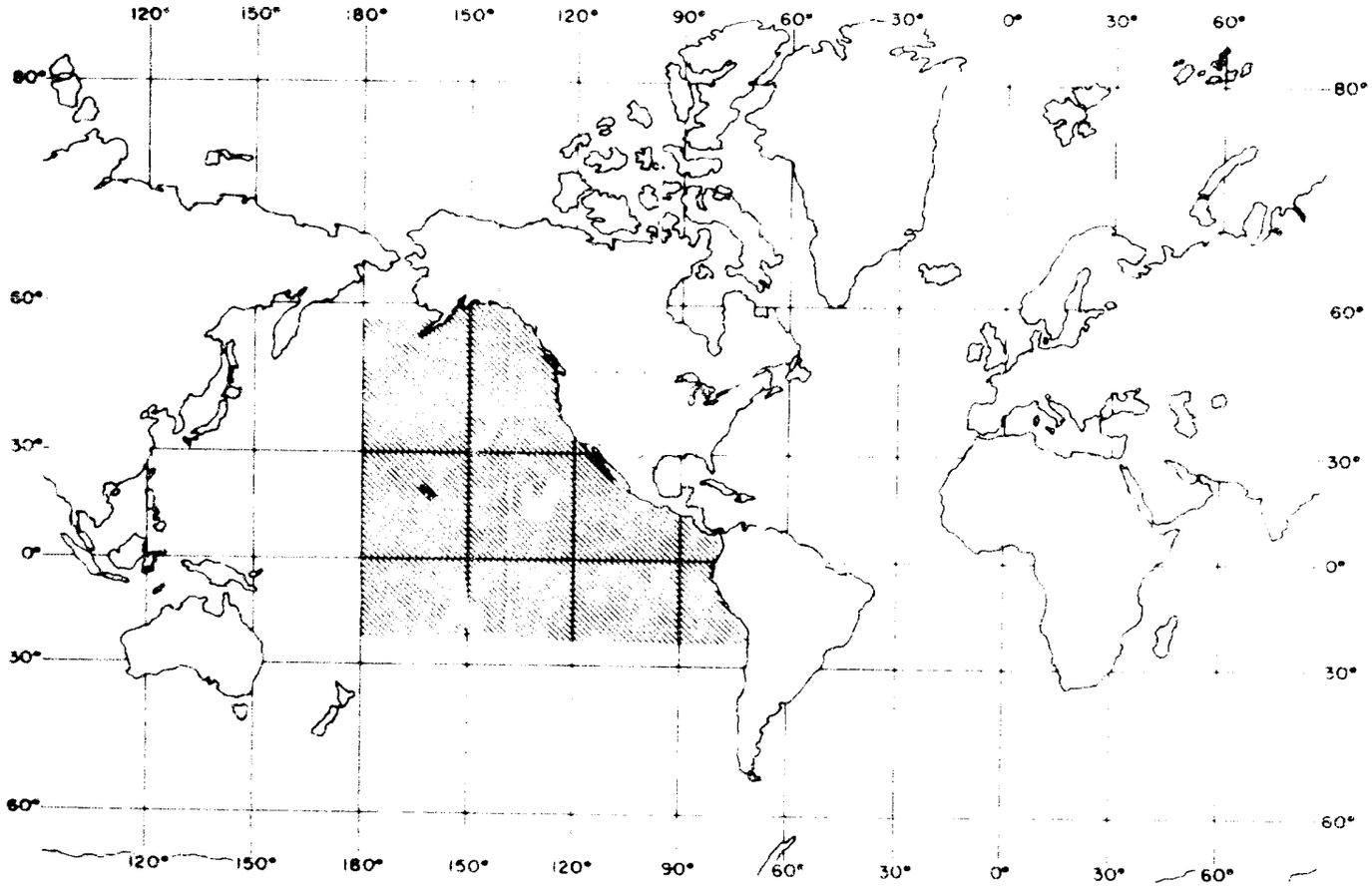
- Area = W. Coast of U.S. to 160° E, 40° N to Bering Sea
- X, Y Spacing = 60 to 100 n. mi. > 400 n. mi. from North American Coast, 5 to 60 n. mi. < 400 n. mi. from North American Coast
- Total Observation Sites Required = 400 (Estimated)



AMO #12—BCF, Seattle—Research on commercial fish.

Legend:

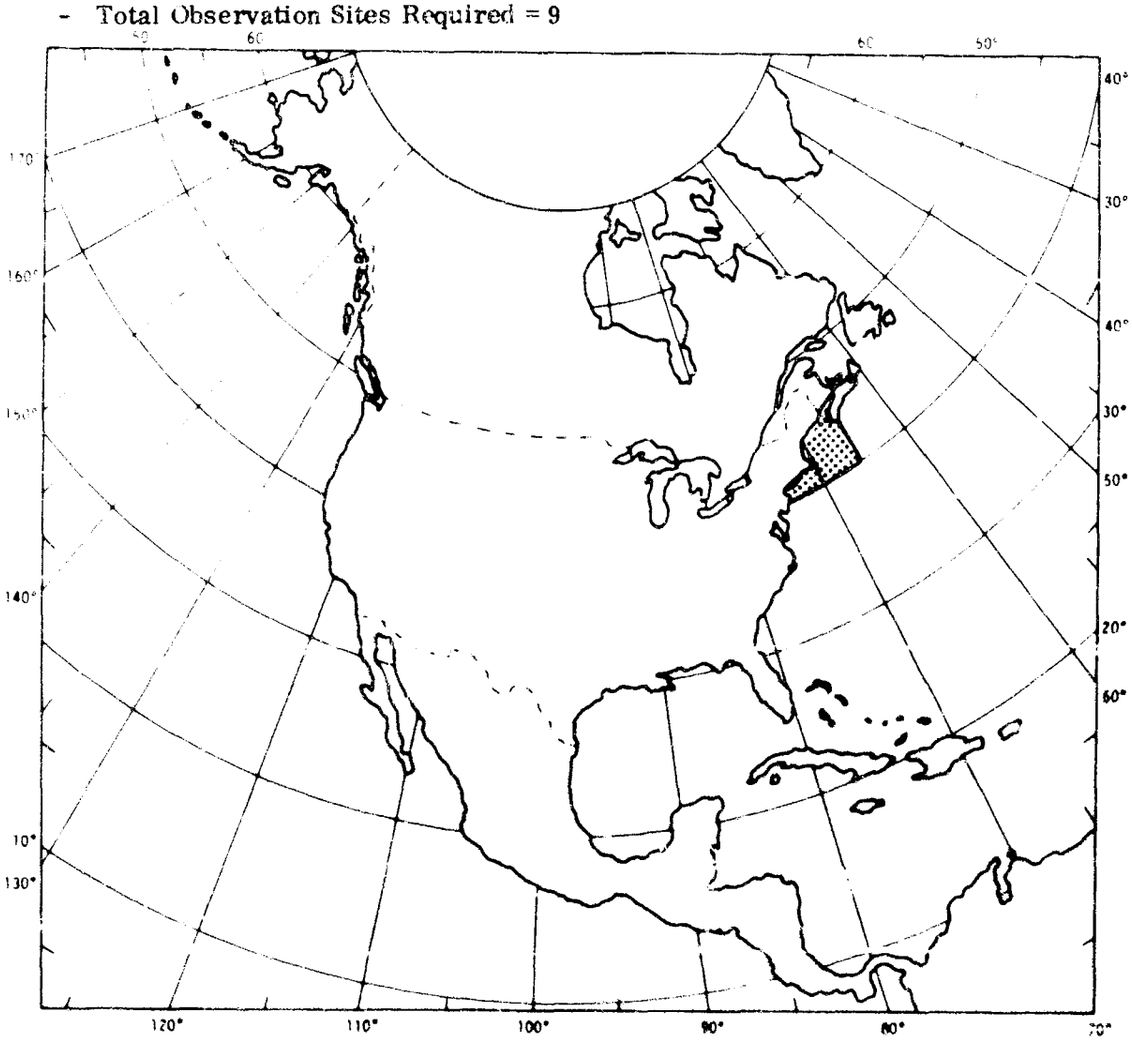
- Area = Cross-Current Lines in Pacific N of 20° S, W Coast to 180°
- X, Y Spacing = 60 to 100 n. mi. in Lines up to 600 n. mi. Apart (≤ 400 n. mi. from North America)
  100 to 300 n. mi. in Lines up to 600 n. mi. Apart (> 400 n. mi. from North America)
- Total Observation Sites Required = 113



AMO #13—BCF, Stanford—Air-sea interaction research.

Legend:

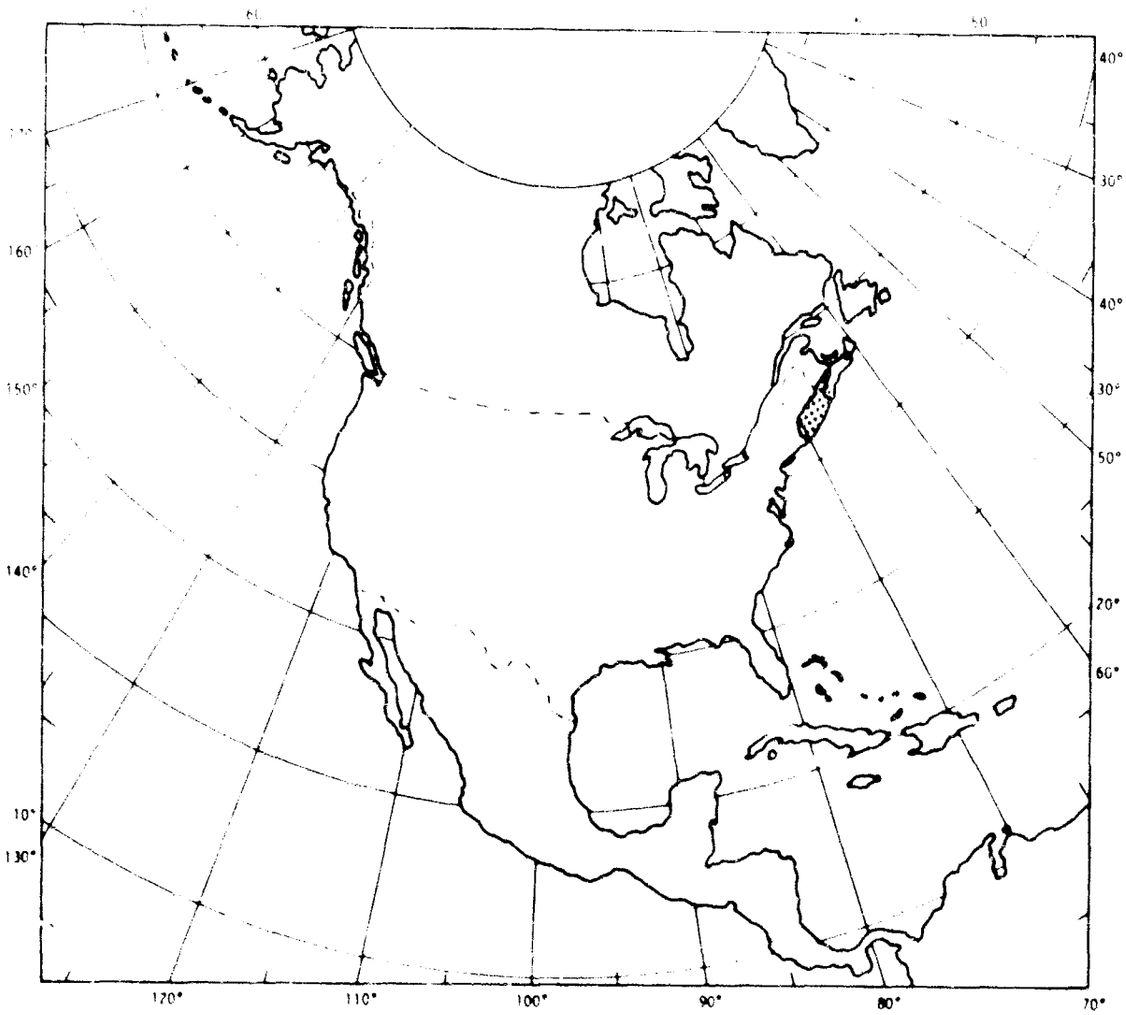
- Area = New England Cont. Shelf 40° N to 45° N and 64° W to 74° W
- X, Y Spacing = 100 to 300 n. mi. for Surface Parameters, 30 to 100 n. mi. for Oceanographic Parameters
- Total Observation Sites Required = 9



AMO #15—BCF, Woods Hole—Research on major ground fish species off New England Coast.

Legend:

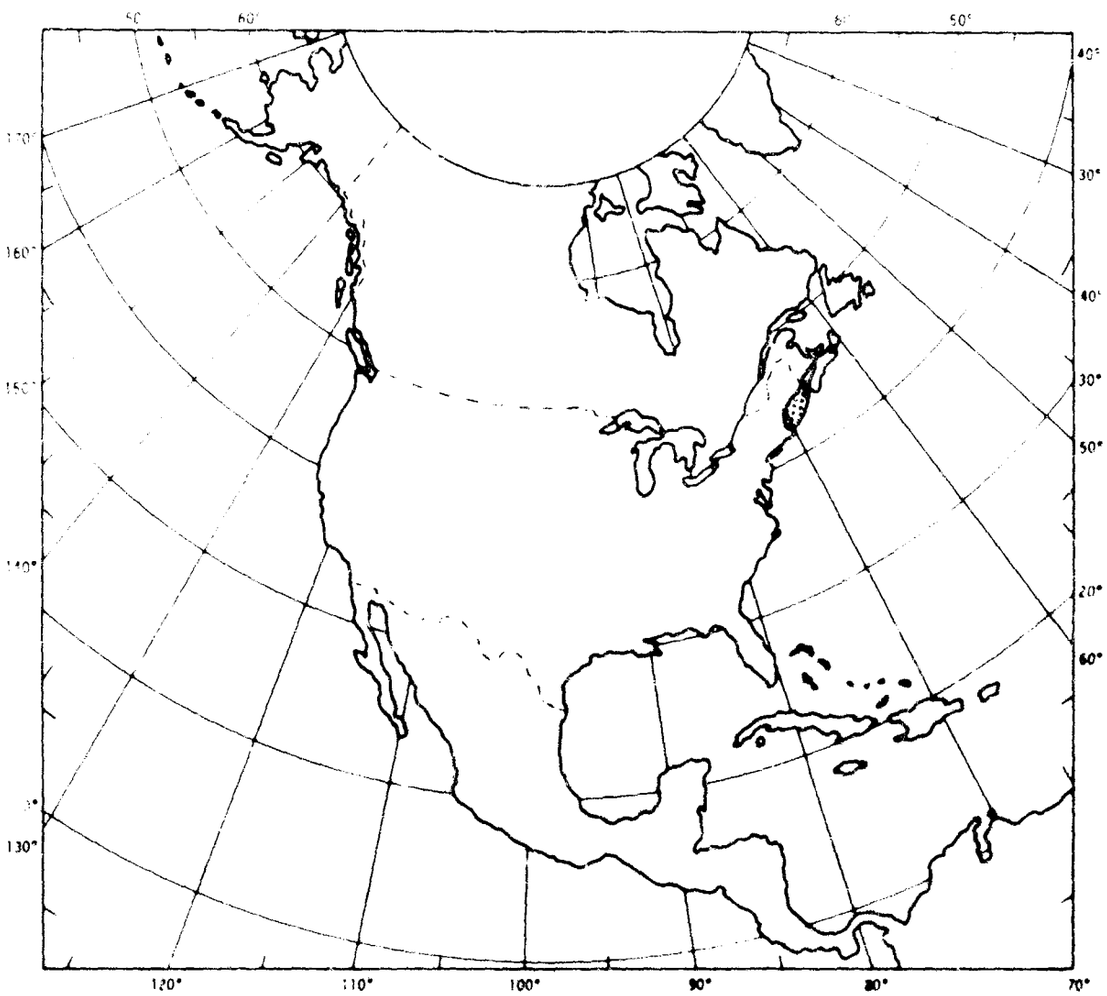
- Area = Gulf of Maine Off Shore
- X, Y S. acing = 25 to 30 n. mi. or at Least 3 Sites
- Total Observation Sites Required = 3



AMO #16—BCF, Booth Bay Harbor—Research on herring, lobster and sardine.

Legend:

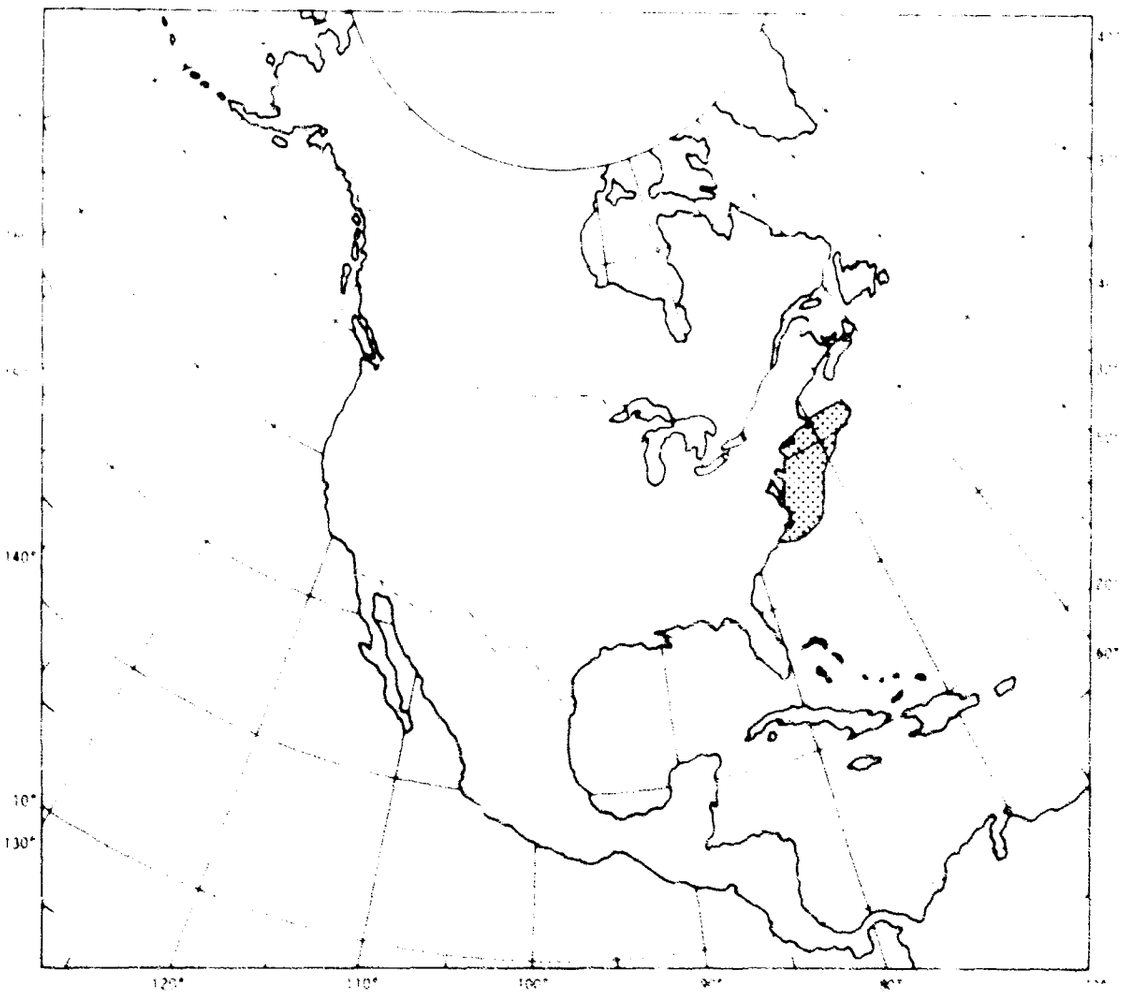
- Area = Gulf of Maine On Shore
- X, Y Spacing = 8 to 13 n. mi.
- Total Observation Sites Required = 50



AMO #17—BCF, Booth Bay Harbor—Research on herring, lobster and sardine.

Legend:

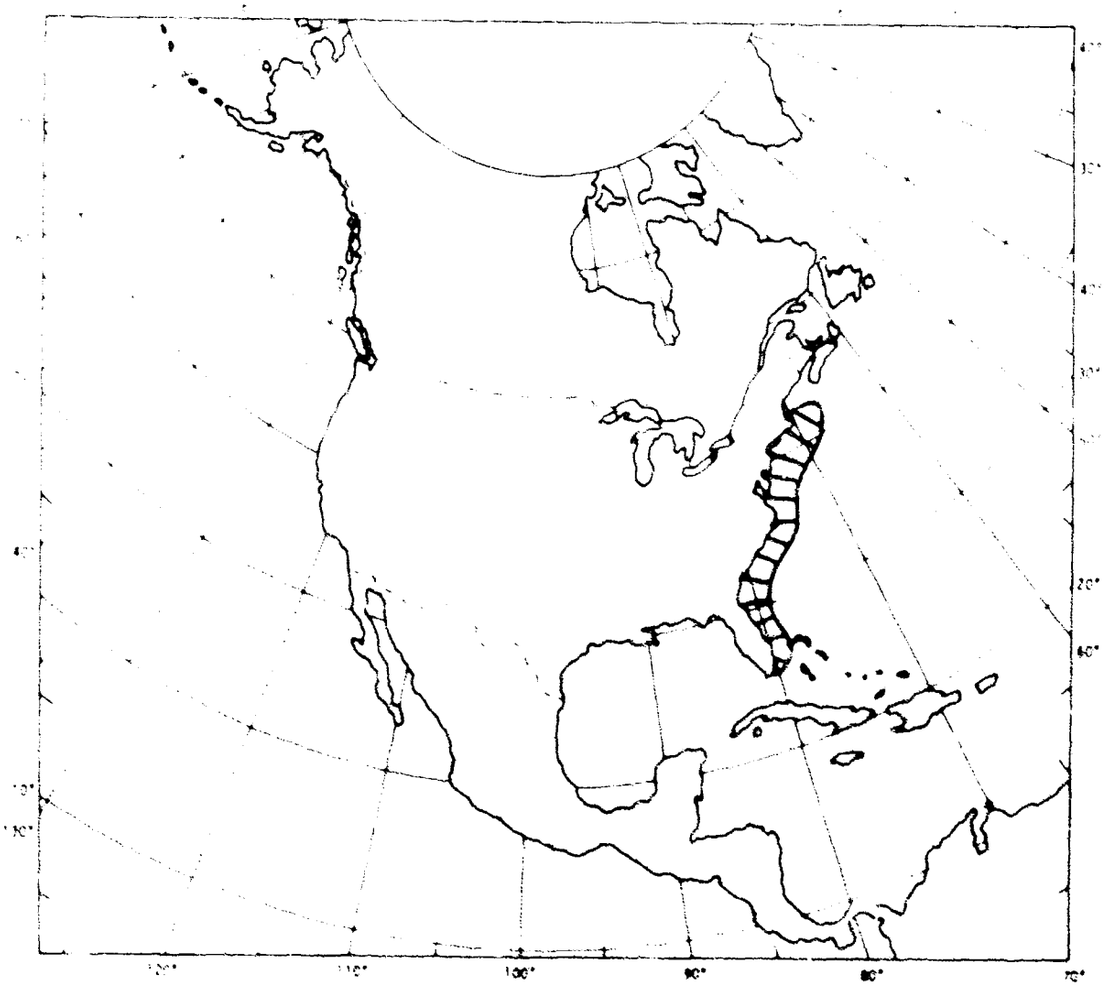
- Area – U.S. Cont. Shelf N of Cape Hatteras
- X, Y Spacing – Transect Lines Variously Oriented with Sites at 20 m Contours on the Lines
- Total Observation Sites Required = 100 (estimated)



AMO #18—BCF, Washington, D. C.—Environmental oceanographic research.

Legend:

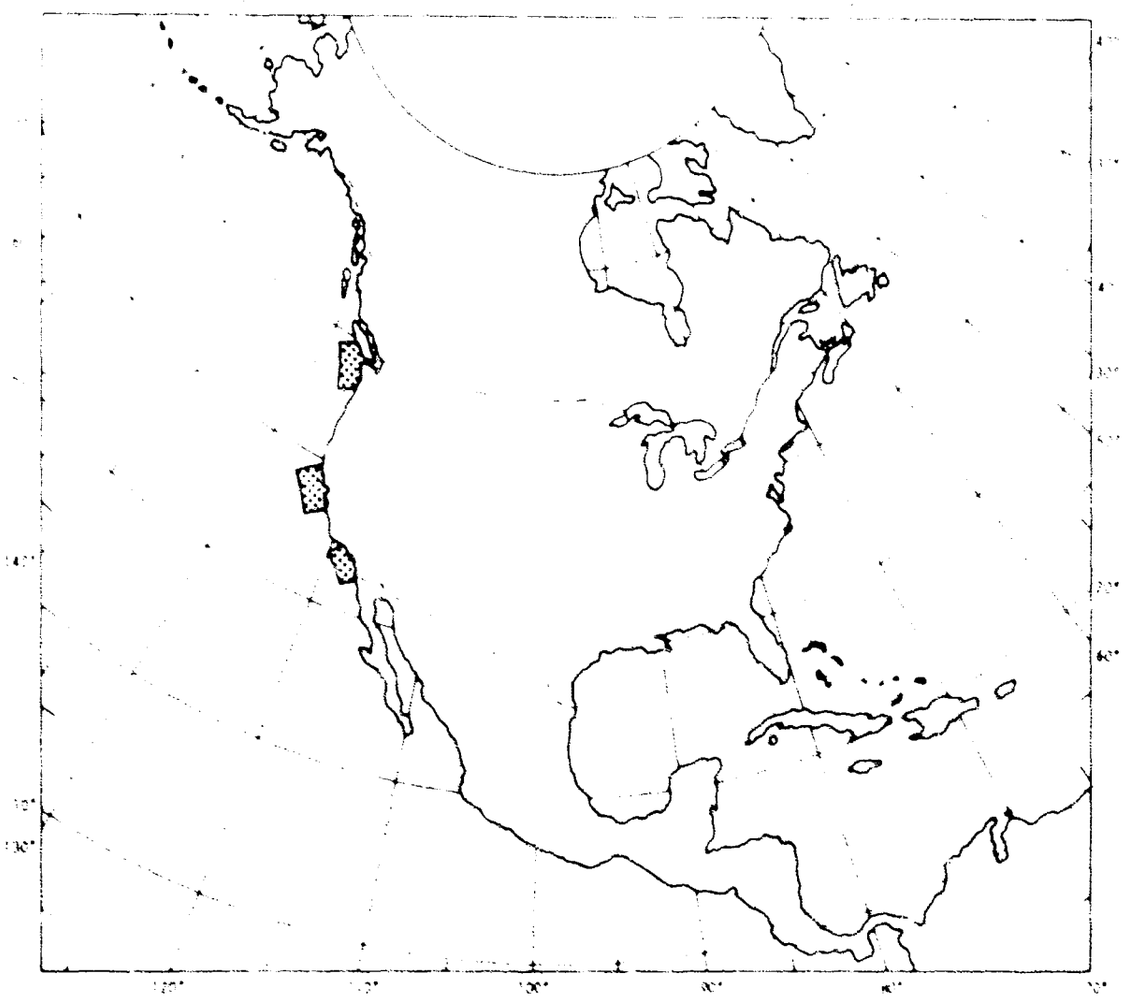
- Area = End of George's Bank to Florida Keys out to a Depth of 70 Fathoms
- X, Y Spacing - Transect Lines About 100 n. mi. Apart, Spacing in Lines = 1, 2, 5, 10, 20, 30, 40, 50 n. mi. from the Coast Line.
- Total Observation Sites Required = 100 (Estimated)



AMO #20—BSF—Sandy Hook Marine Lab.—Fish distribution along east coast of U.S.

Legend:

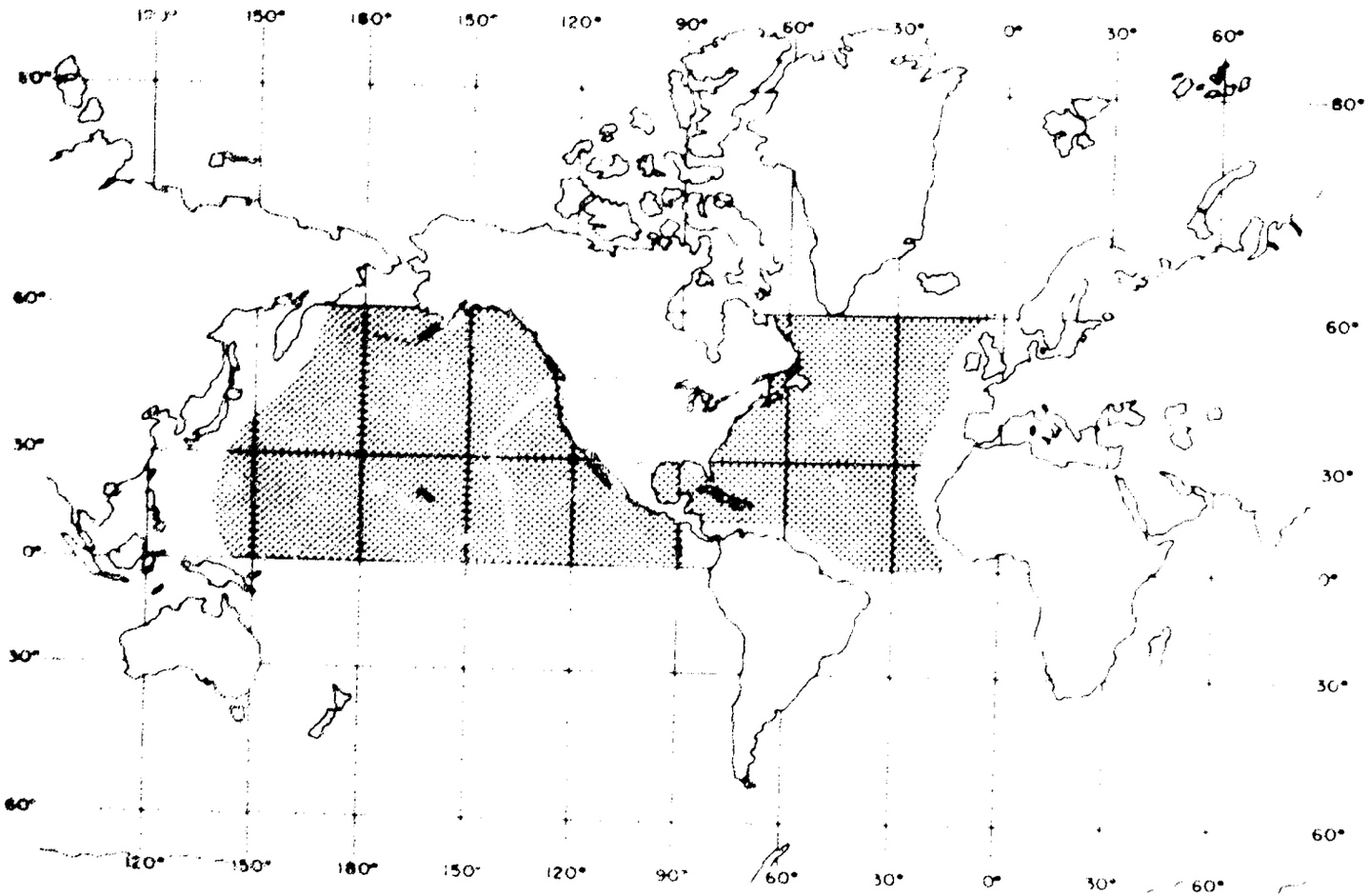
- Area = West Coast Cont. Shelf of U.S. (3 Areas)
- X, Y Spacing = Varies 10 to 45 n. mi.
- Total Observation Sites Required = 100 (Estimated)



AMO #21—BSF, Tiburon—Fish distribution along west coast of U.S.

Legend:

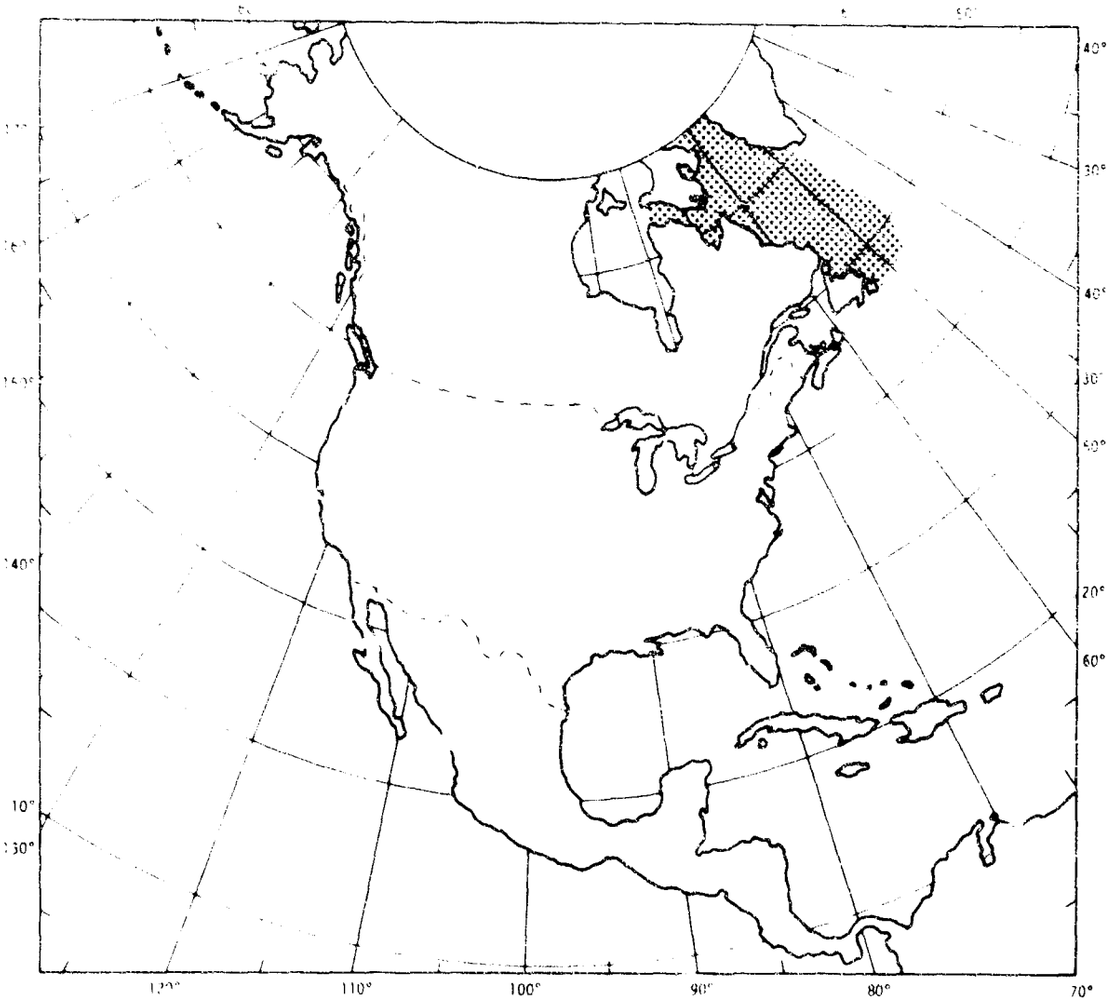
- Area = North American Coast, Deep Ocean Atlantic and Pacific
- X, Y Spacing = 50 n. mi.
- Total Observation Sites Required = Variable as Probably Only a Few Areas at a Time



AMO #22—Bureau of Mines, Dept. of Interior—Develop marine mining technology.

Legend:

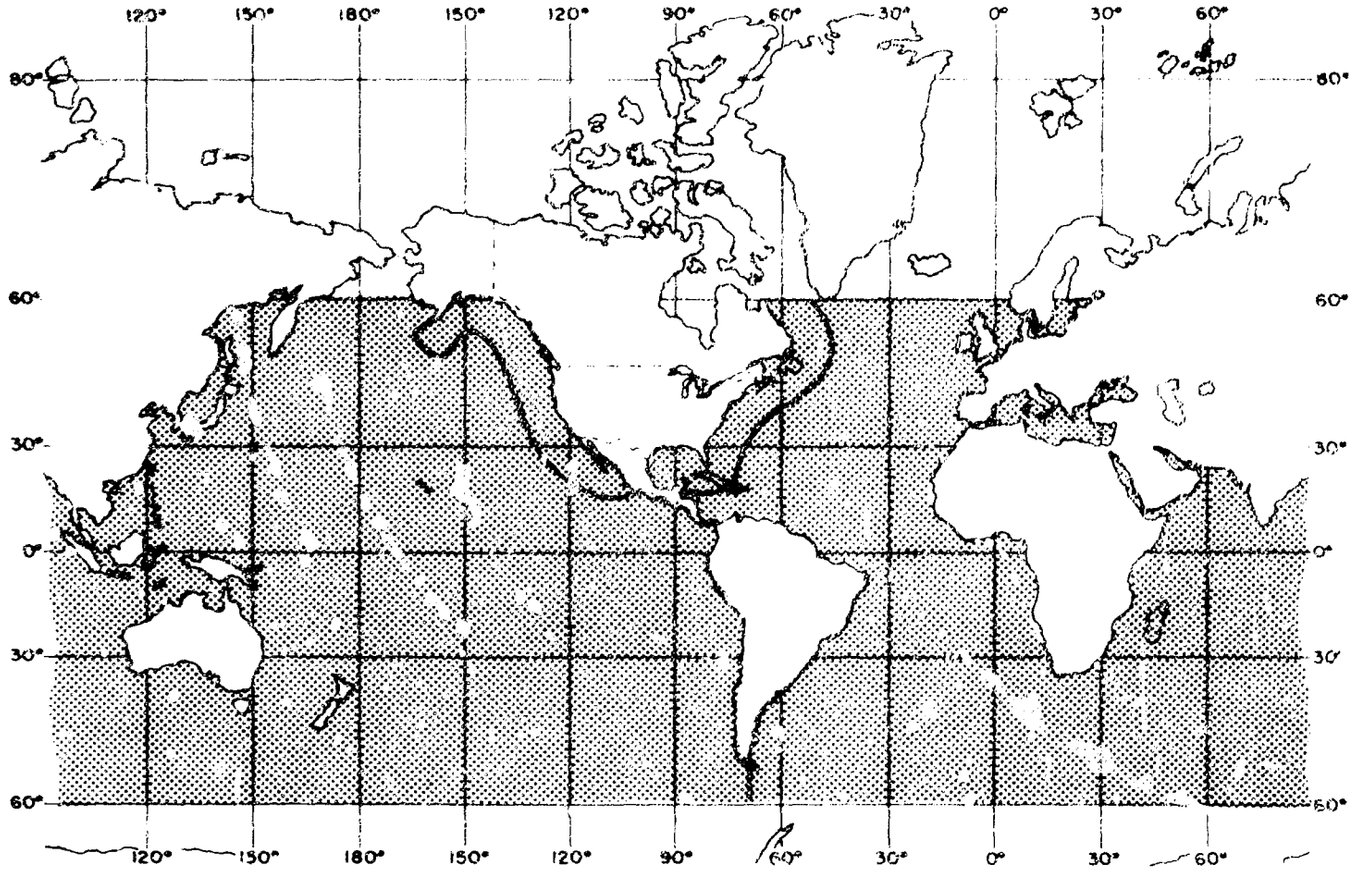
- Area = Grand Banks, Labrador Sea, Baffin Bay and Hudson Straits
- X, Y Spacing = 30 to 100 n. mi.
- Total Observation Sites Required = 111 (100 are N of 60° N)



AMO #26—USCG, Ice Patrol—Icebreaking and research on polar oceanography.

Legend:

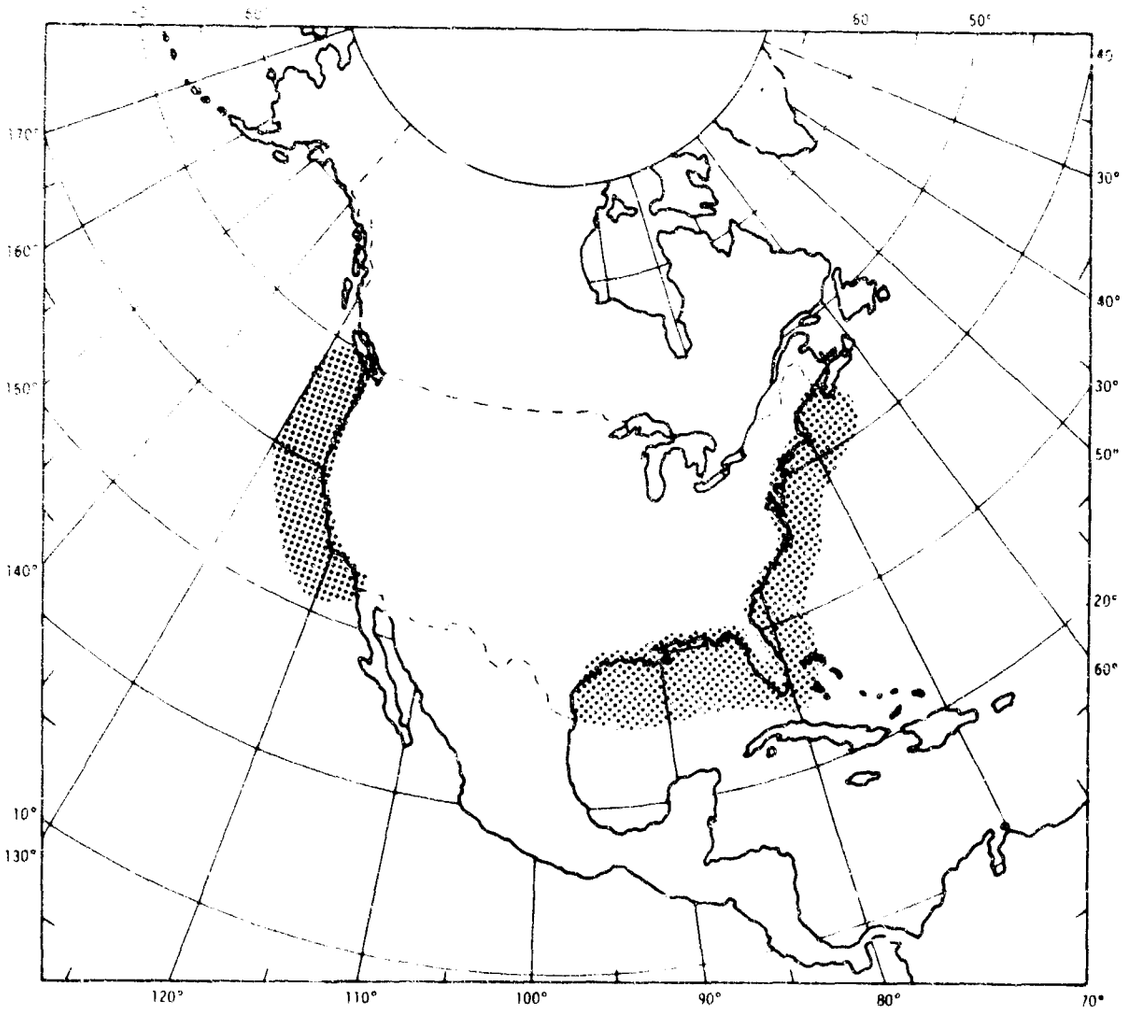
- Area = Global Deep Ocean and North American Coast (Selected Areas for 30 day Periods)
- X, Y Spacing = 300 to 600 n. mi. (DO) and 60 to 150 n. mi. (CNA)
- Total Observation Sites Required = A Few at a Time for 30 Days



AMO #31, 32, 36 and 37—ESSA—Total agency research requirements.

Legend:

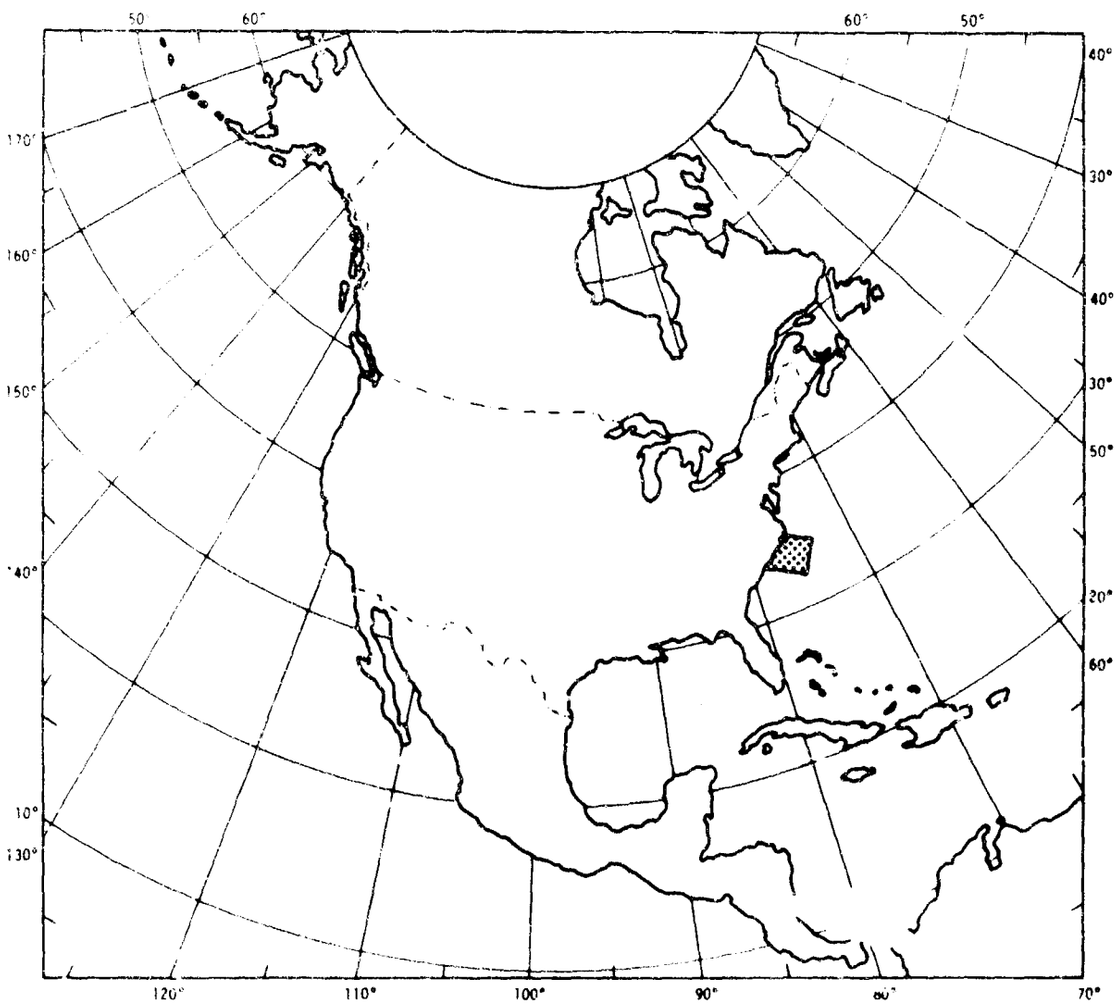
- Area = U.S. Coastal Waters
- X, Y Spacing = 25 to 50 n. mi. ≤ 50 n. mi. from the Coast and 100 n. mi. Elsewhere Plus 4 Sites in Specified Areas
- Total Observation Sites Required = 74 Plus an Unknown Number in Estuaries



AMO #40—HEW, PHS—Research on effect of pollutants on shellfish.

Legend:

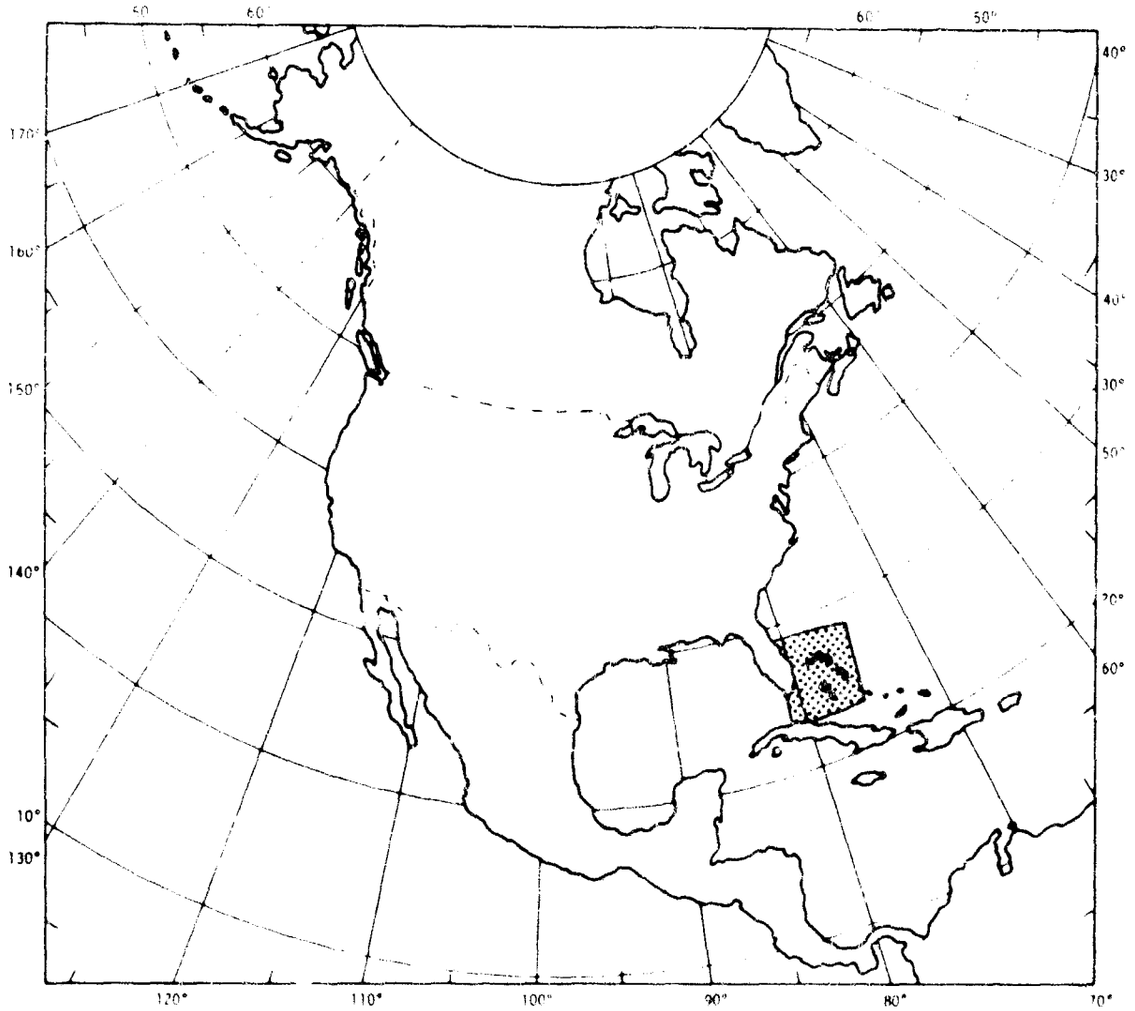
- Area = Onslow Bay, North Carolina to 100 n. mi. out in Gulf Stream
- X, Y Spacing = 1 Line with Sites Spaced at 10, 25, 50, 75, 100 and 200 m Contours Plus 1 Site on Either Side of Line About 30 n. mi. Distance
- Total Observation Sites Required = 8



AMO #44—NSF, Duke U.—Basic research in Gulf Stream structure and dynamics.

Legend:

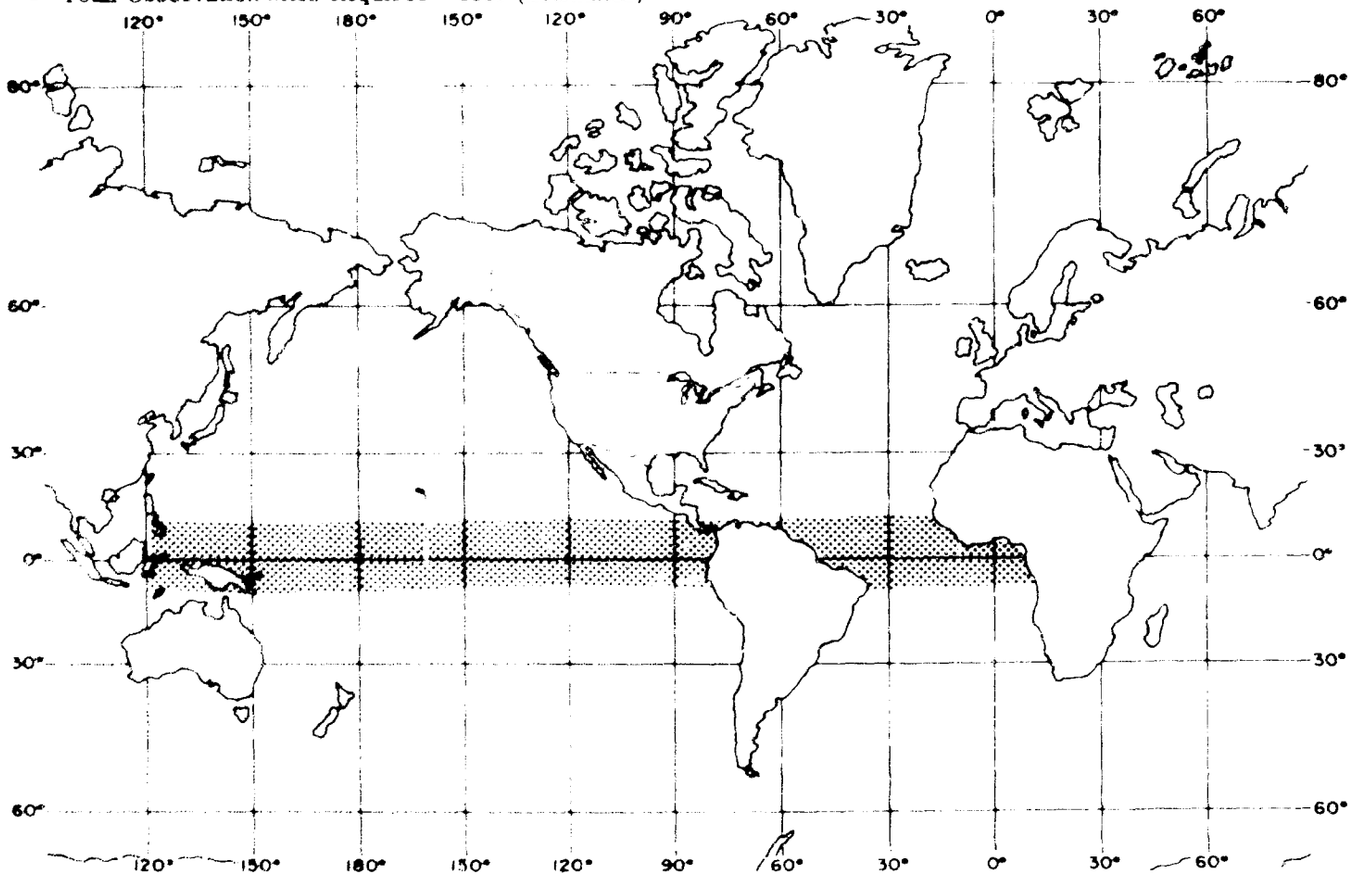
- Area – Florida Straits, off Bimini, Bahamas and Miami
- X, Y Spacing = Special Points about 3 and 7 n. mi. from a Sound Source
- Total Observation Sites Required = 20 (Estimated)



AMO #47—USF, U. of Miami—Research on oceanographic environmental parameters and underwater acoustical propagation

Legend:

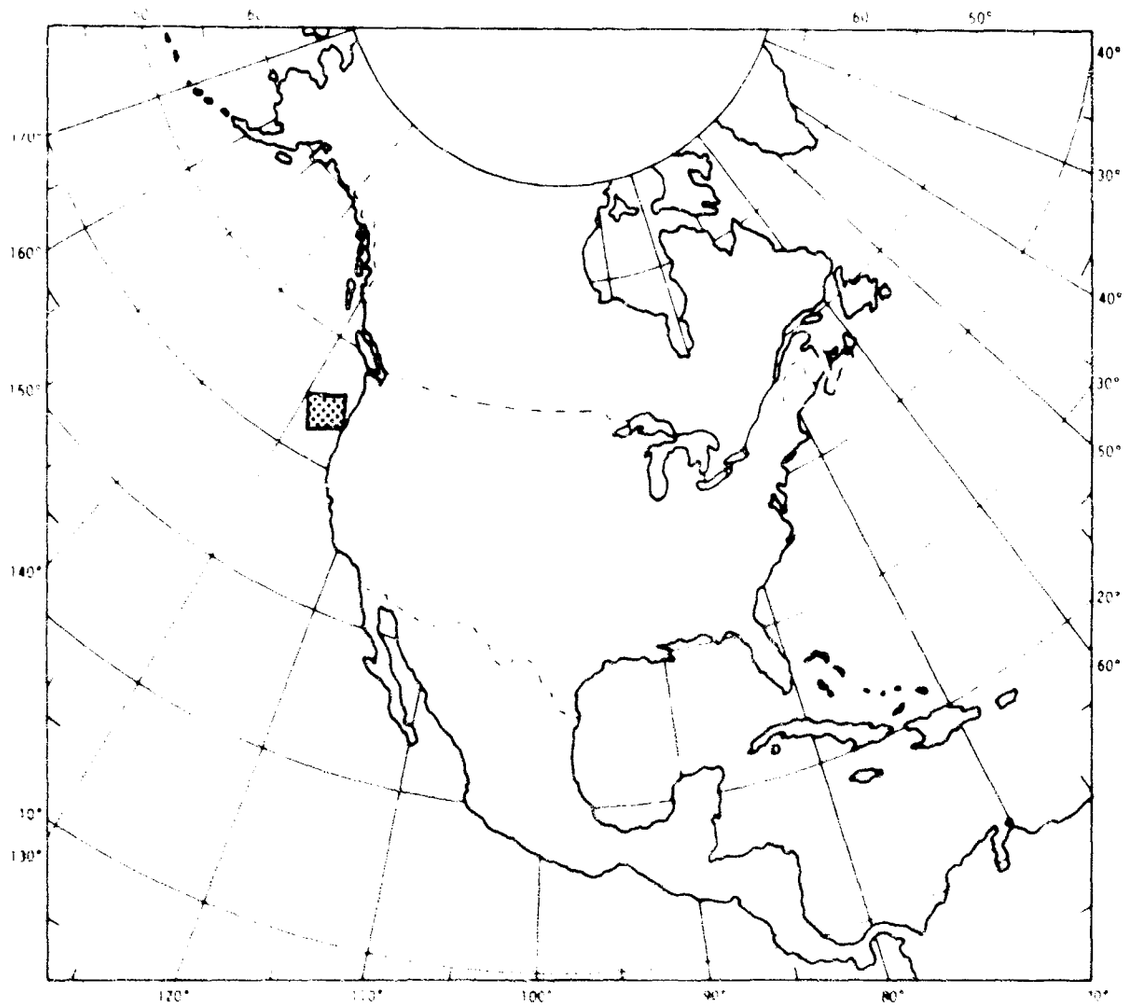
- Area = Atlantic and Pacific 12° N to 12° S
- X, Y Spacing = 15 to 30 n. mi. from 2° N to 2° S, Elsewhere 50 n. mi. in Current and 300 n. mi. Outside of Current
- Total Observation Sites Required = 1500 (Estimated)



AMD #49—NSF, U. of Miami—Research on oceanographic enivironmental parameters and equatorial current system.

Legend:

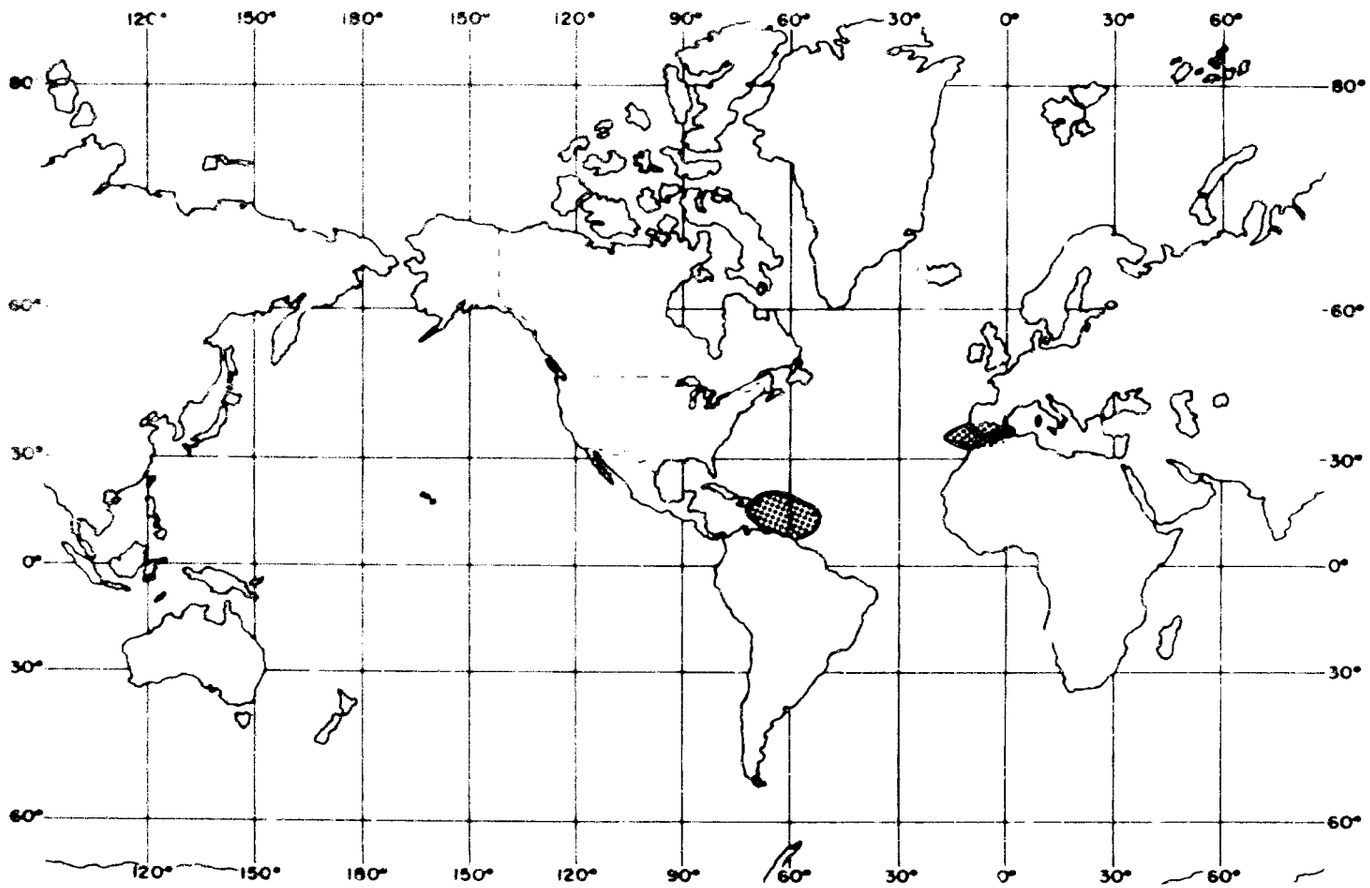
- Area = 100 mi. Square Centered at 45° N and 125° W
- X, Y Spacing = Not Certain May Be About 5 n. mi.
- Total Observation Sites Required = 35 (Estimated)



AMO #51—NSF, Oregon State U.—Research on wind stress on the ocean.

Legend:

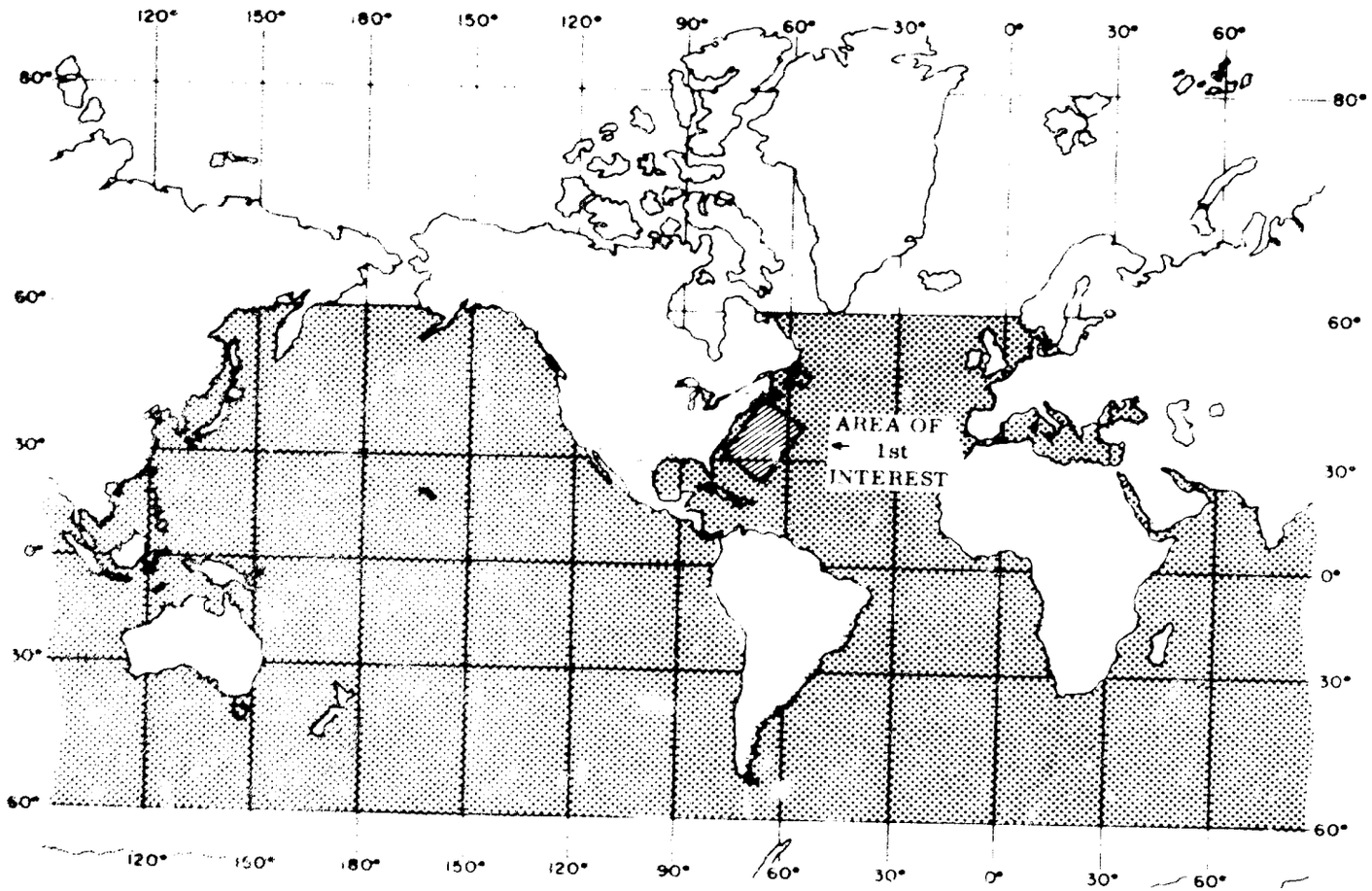
- Area = Gibraiter and Caribbean
- X, Y Spacing = 1 Per Area Except in Deep Channels Where Spacing of 2 to 5 n. mi. May Be Necessary
- Total Observation Sites Required = 8



AM. #54—NSF, Lamont Geophysical Observatory—Current measurements along sills and renewal of water in deep basins.

Legend:

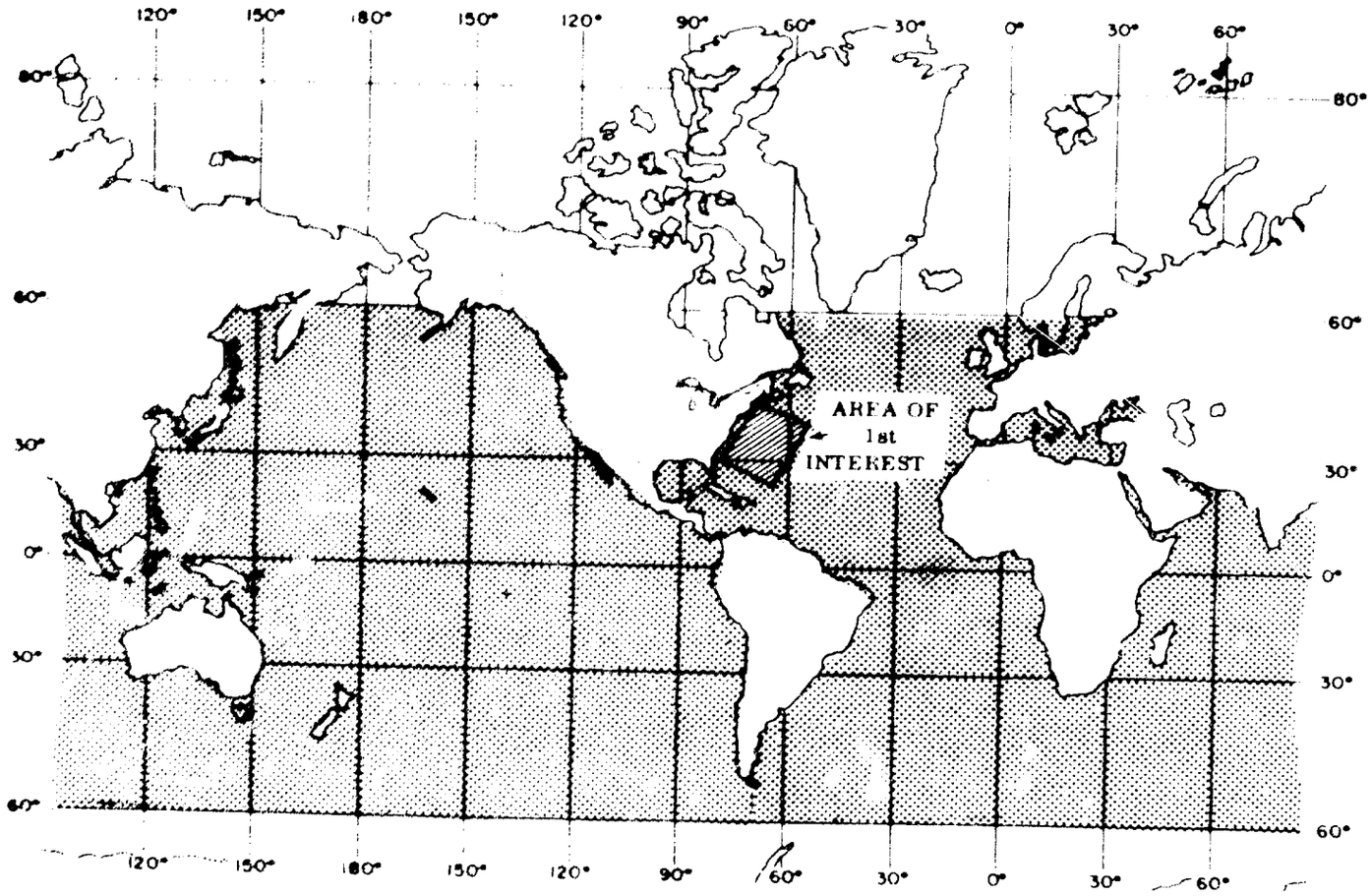
- Area = World Oceans and East Coast of U. S.
- X, Y Spacing = 200 to 300 n. mi. Except 20 n. mi. in Strong Currents
- Total Observation Sites Required = 800 (Estimated)



AMO #56—ONR, New York U.—General Circulation of the oceans.

Legend:

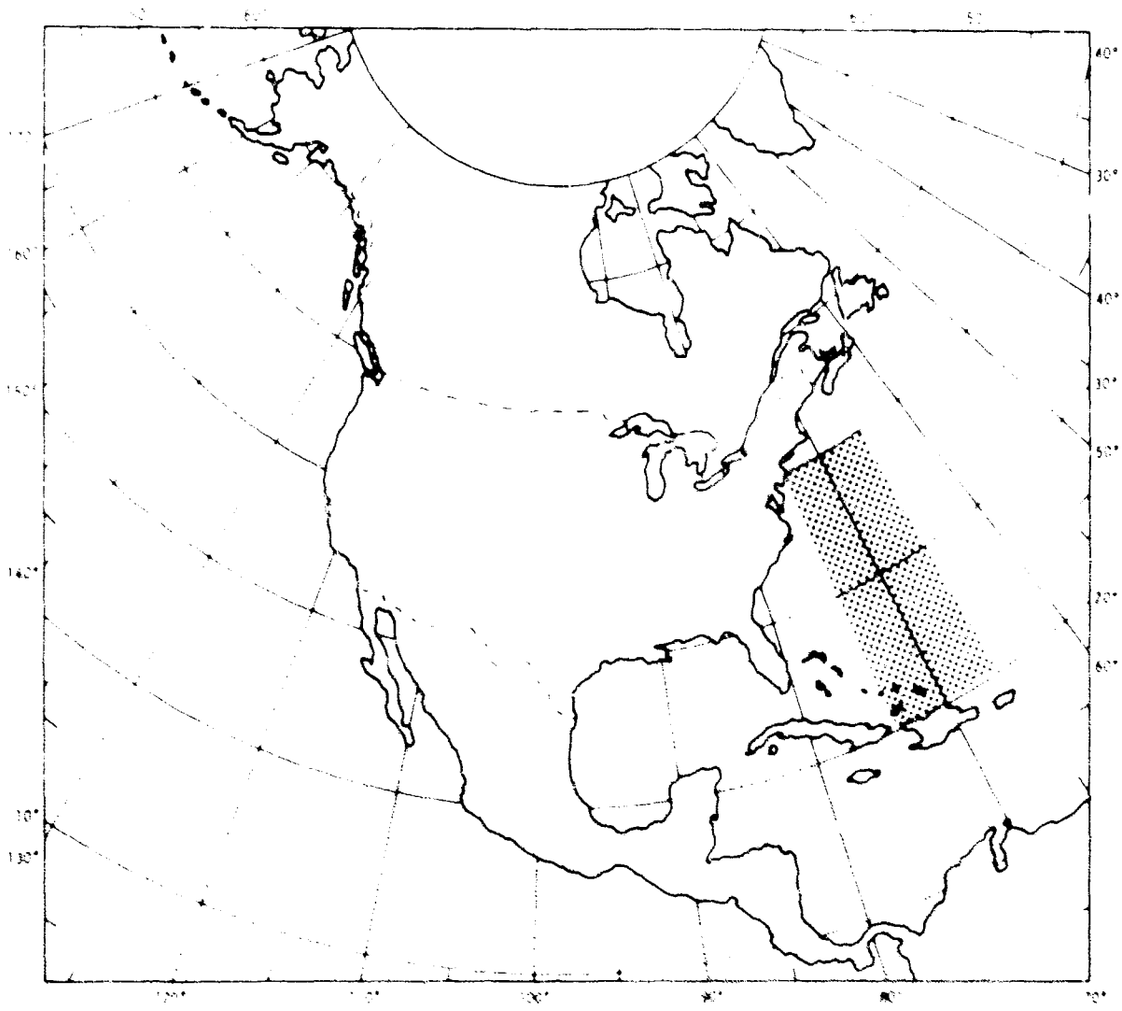
- Area = World Oceans and East Coast of U.S.
- X, Y Spacing = 200 to 300 n. mi. Except 20 n. mi. in Strong Currents
- Total Observation Sites Required = 800 (Estimated)



AMO #57—ONR, New York U.—Air/sea interaction—emphasis on wave forecasting.

Legend:

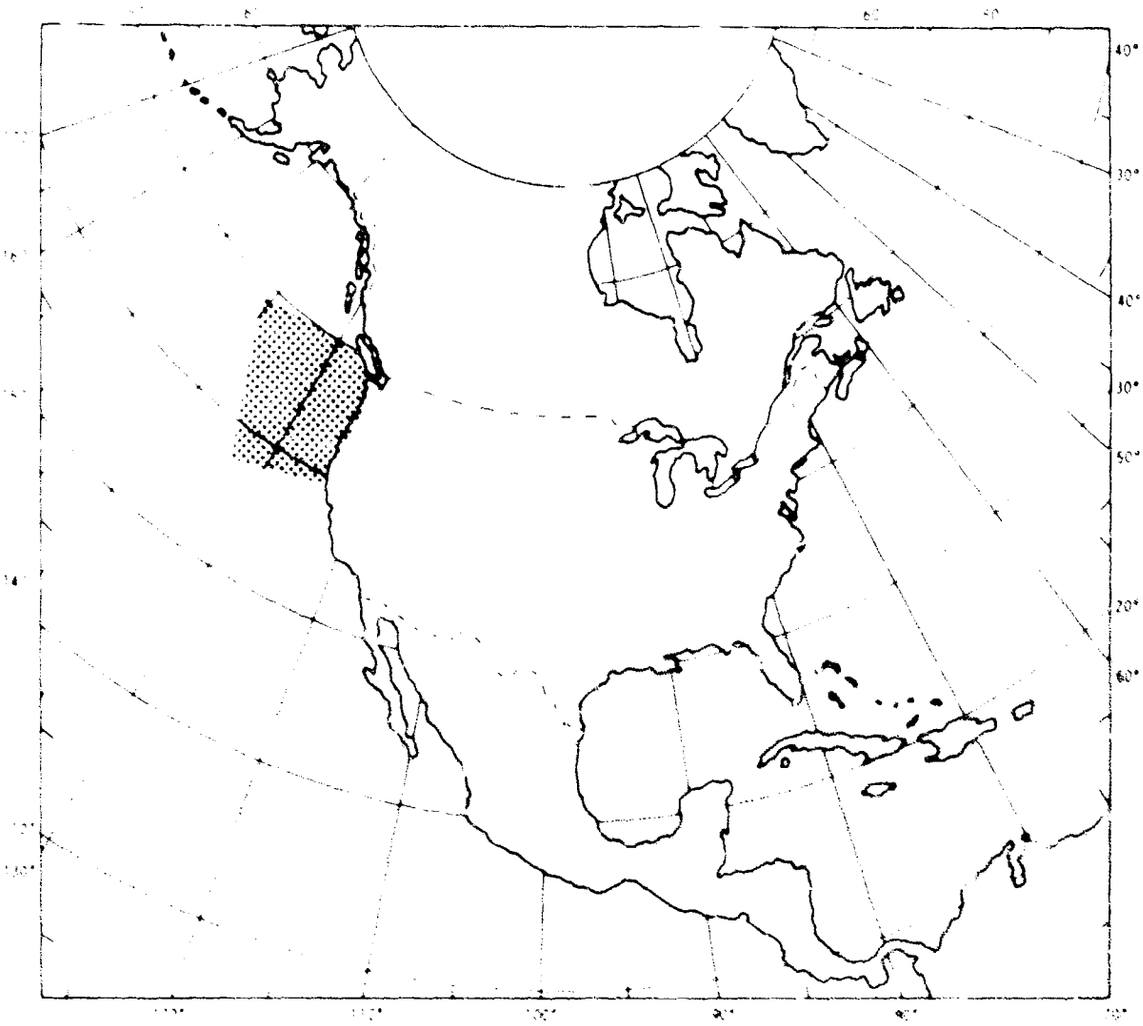
- Area = 20° N to 40° N and 65° W to 75° W
- X,Y Spacing = 6 n. mi. in Gulf Stream and 20 n. mi. Outside of Stream
- Total Observation Sites Required = 2000 (Estimated)



AMO #58—NSF, Woods Hole—Study dynamic process of the western North Atlantic.

Legend:

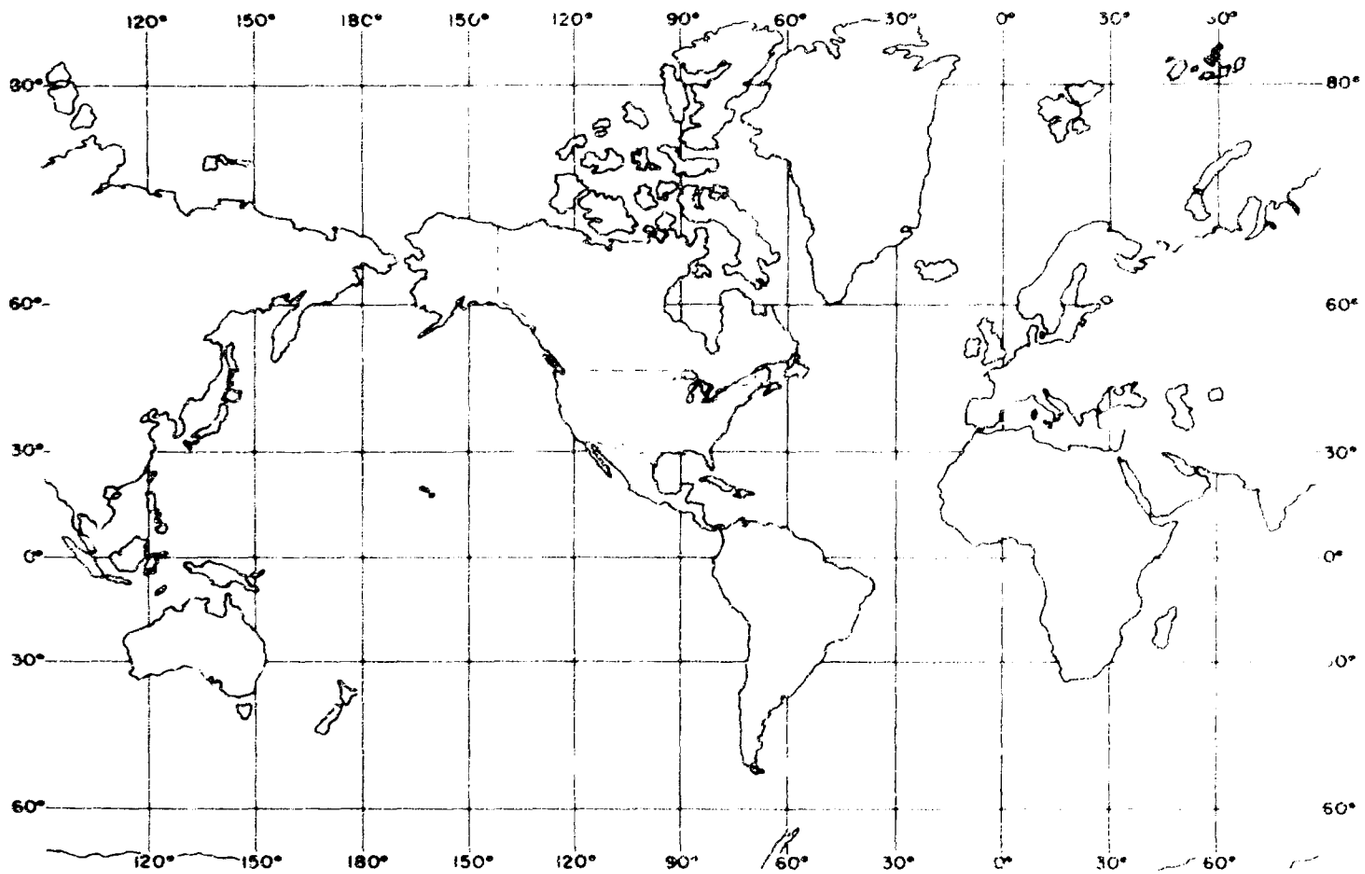
- Area = Mouth of the Columbia River to 600 n. mi. W, 300 n. mi. S and 200 n. mi. N
- X, Y Spacing = 25 n. mi.
- Total Observation Sites Required = 480



AMO #59—NSF, U. of Washington—Study effluent waters of the Columbia River.

Legend:

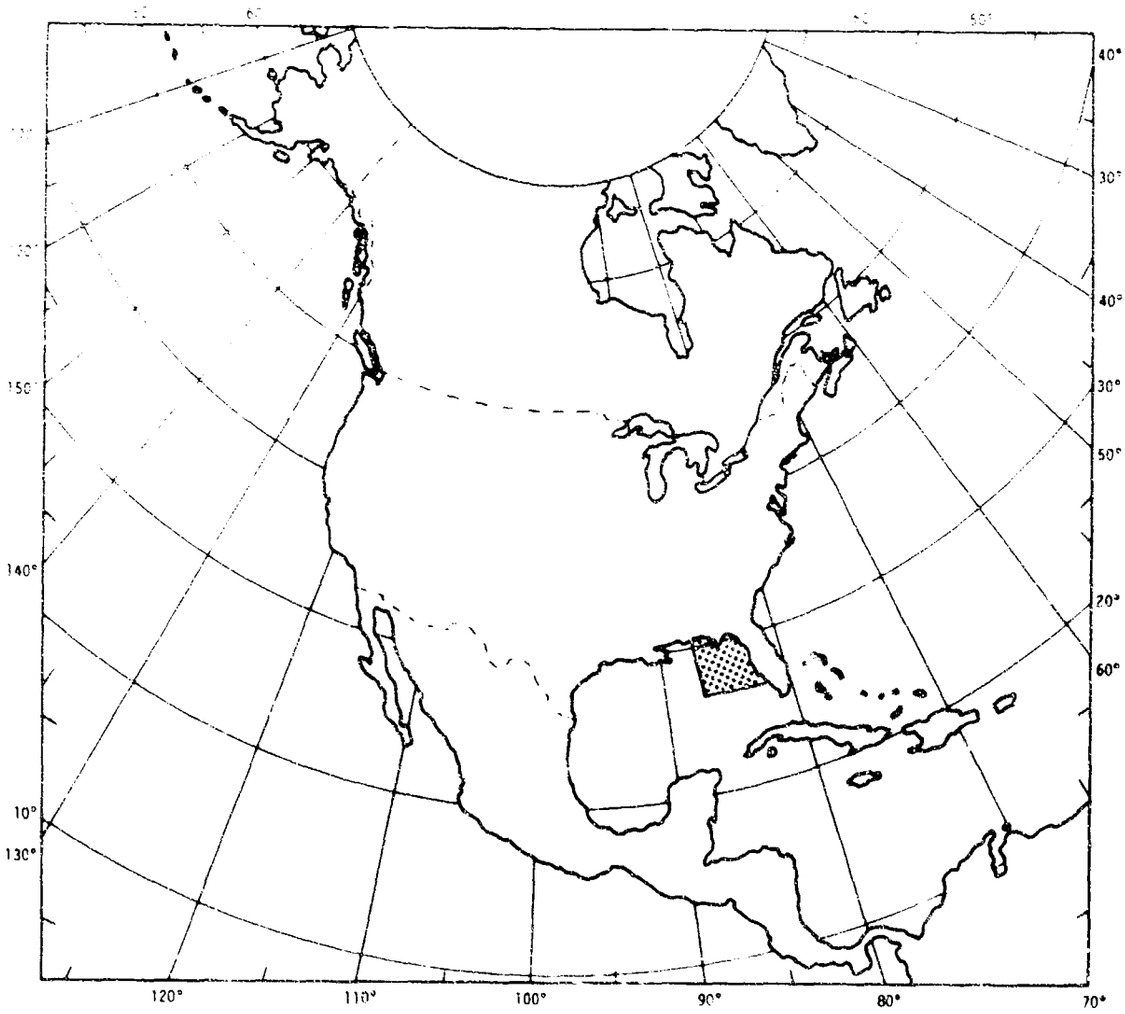
- Area = Unknown
- X, Y Spacing = 10 n. mi.
- Total Observation Sites Required = Unknown



AMO #62—Smithsonian Institution—Biological growth studies.

Legend:

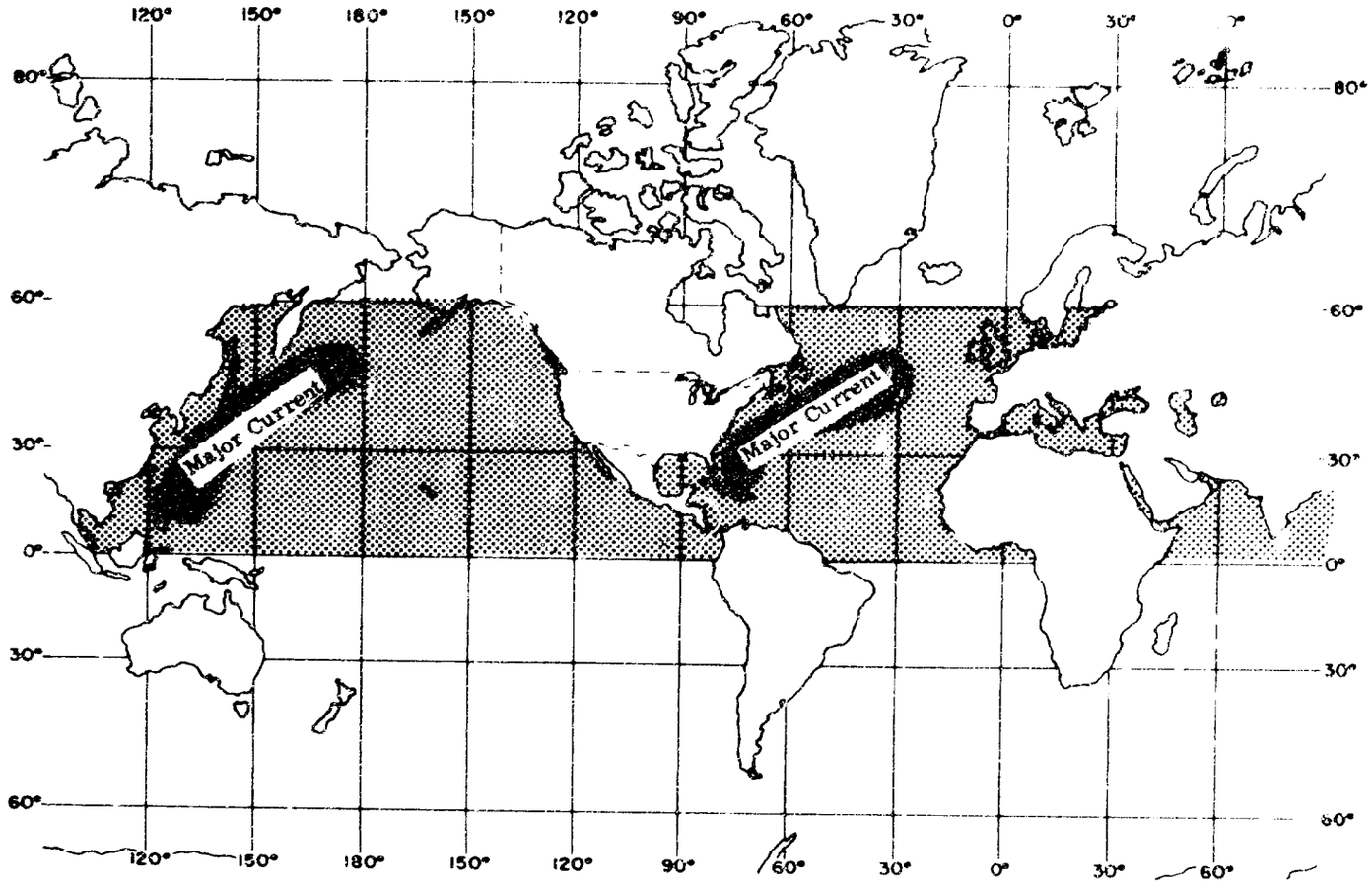
- Area = Gulf of Mexico Near Panama City Out to 200 m Depths
- X, Y Spacing = 1/4 n. mi. to 10 n. mi.
- Total Observation Sites Required = 200 (Estimated)



AMO #65—USN, Mine Defense Lab.—Mine defense including inshore undersea warfare.

Legend:

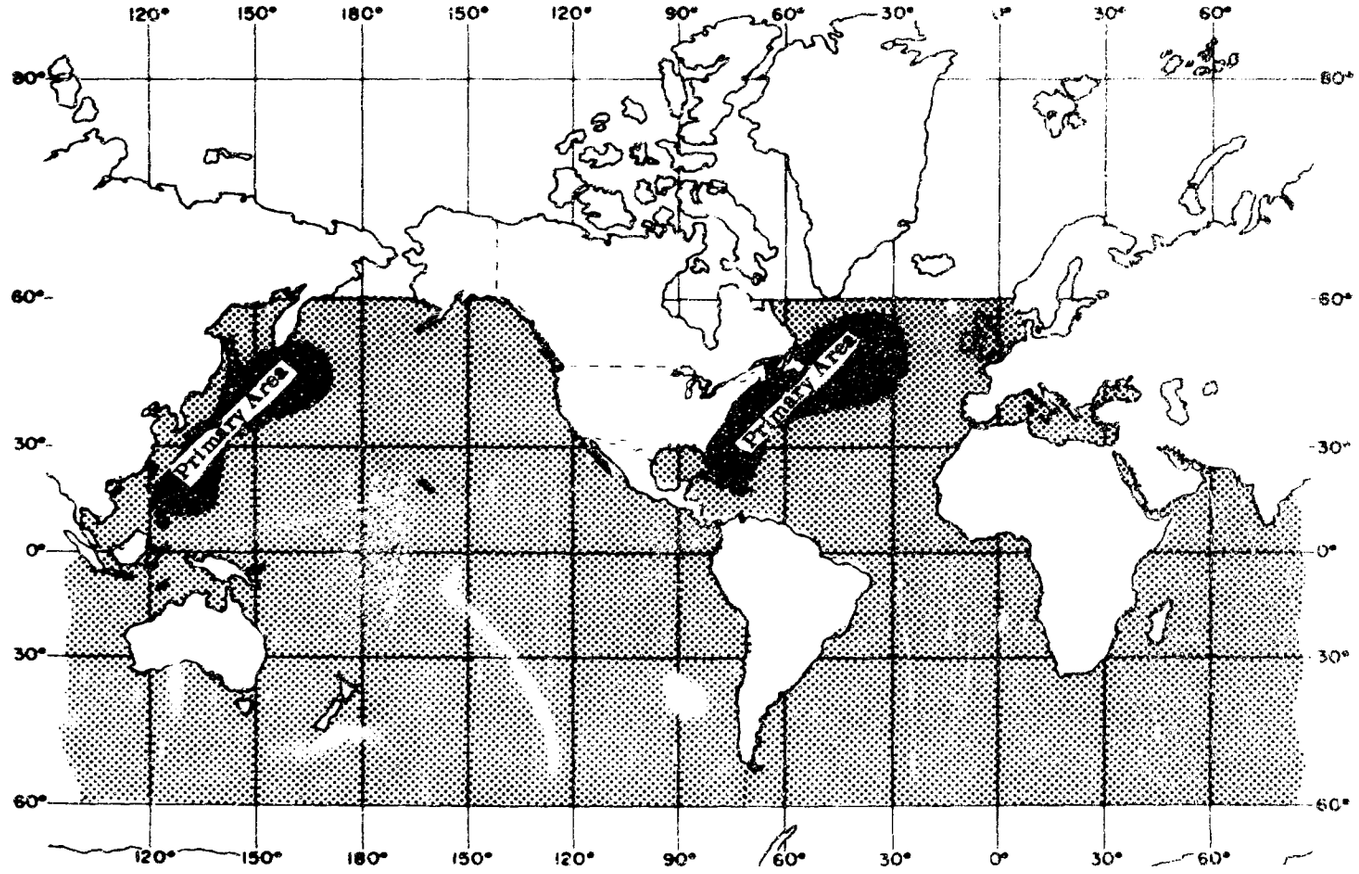
- Area = Northern Hemisphere Oceans, Primary Interest Within Major Current Areas
- X, Y Spacing = Varies 30, 50, 400 n. mi. in Current Areas, 80 and 400 n. mi. Outside Current Areas
- Total Observation Sites Required = 600 (Estimated)



AMO #66—NOO, ASWFPS—Oceanographic environmental prediction techniques, R & D test and evaluation.

Legend:

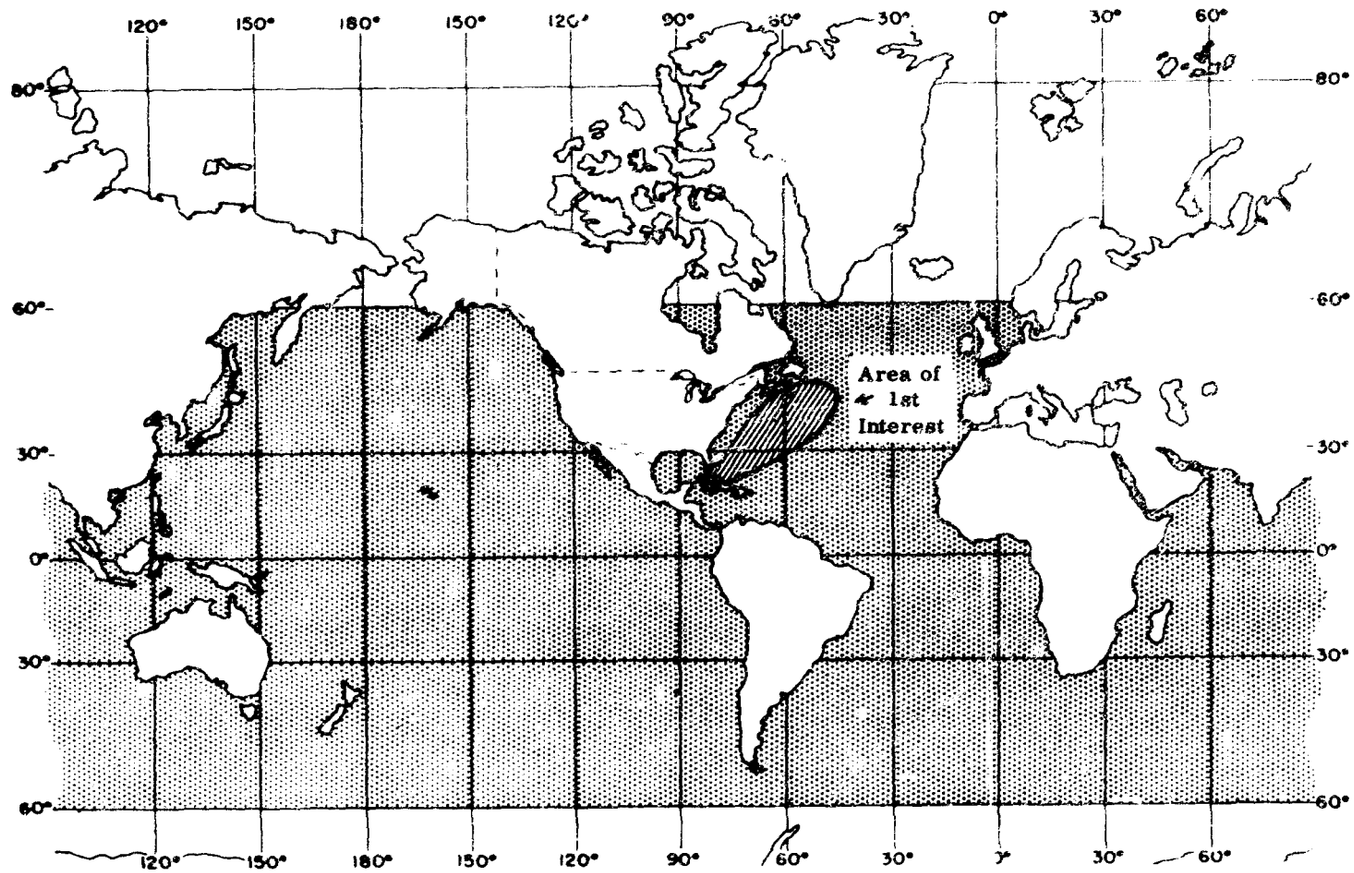
- Area = World Oceans
- X, Y Spacing = 300 n. mi.
- Total Observation Sites Required = 610



AMO #76—ORL, Penn. State—Large scale factors affecting transmission of underwater sound.

Legend:

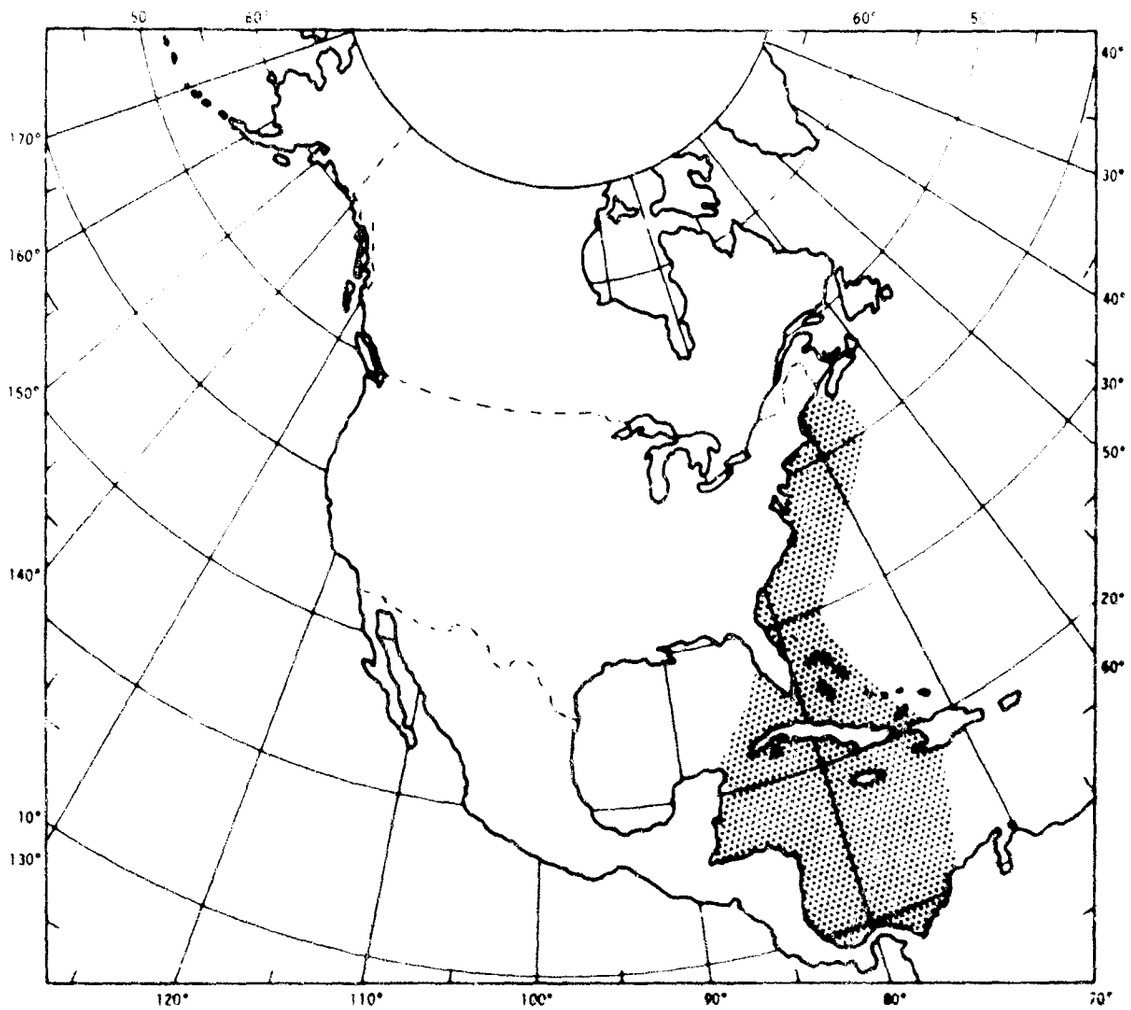
- Area = Selected Areas of World Oceans
- X, Y Spacing = 8 Buoys in a 5.5 n. mi. Grid
- Total Observation Sites Required = Variable, Probably a Few at a Time



AMO #77—ORL, Penn. State—Small scale factors affecting transmission of underwater sound.

Legend:

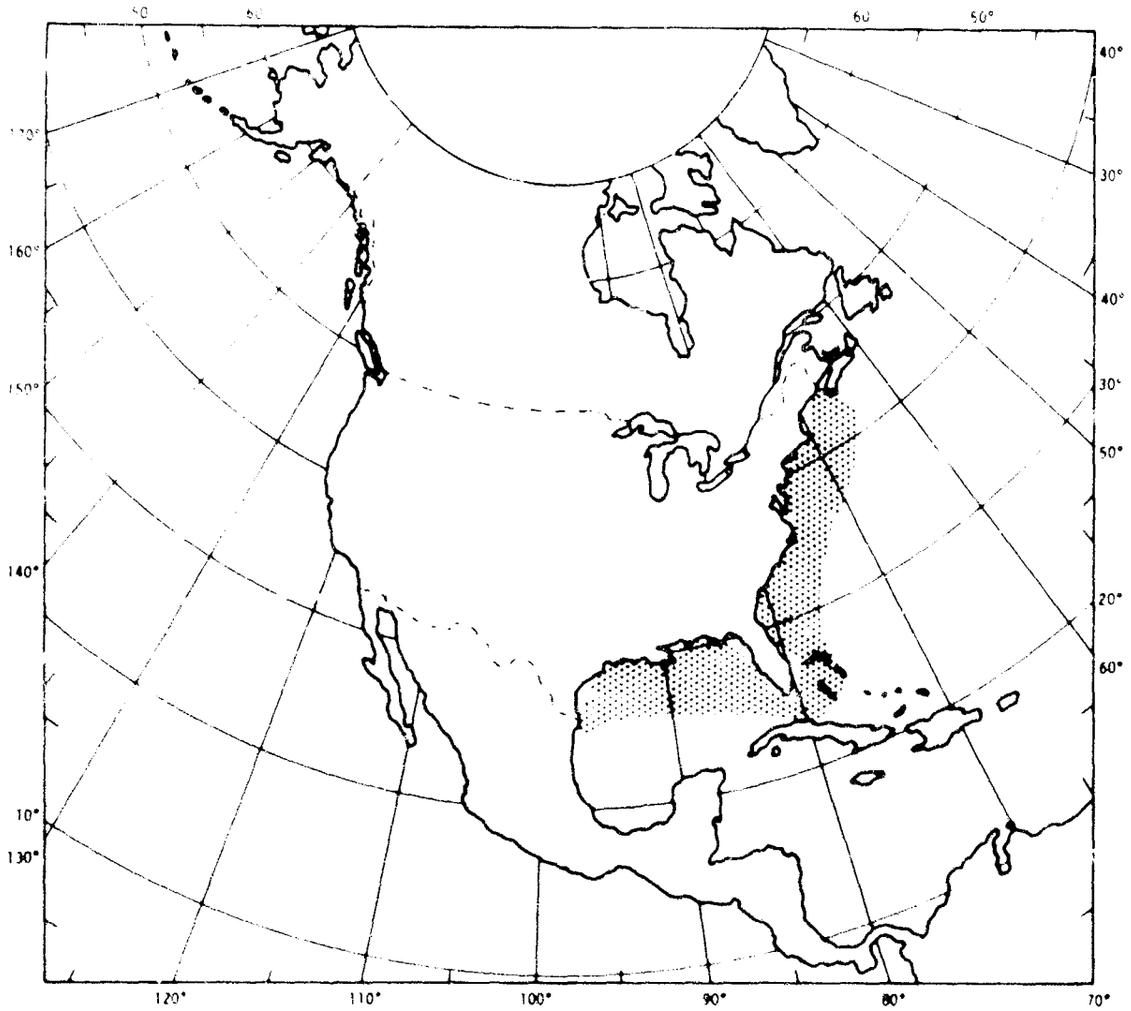
- Area = East Coast and Caribbean
- X, Y Spacing = 1 Point at a Time
- Total Observation Sites Required = 1 at a Time



AMO #79—USN, Marine Eng. Lab.—Testing of deeply submerged machinery.

Legend:

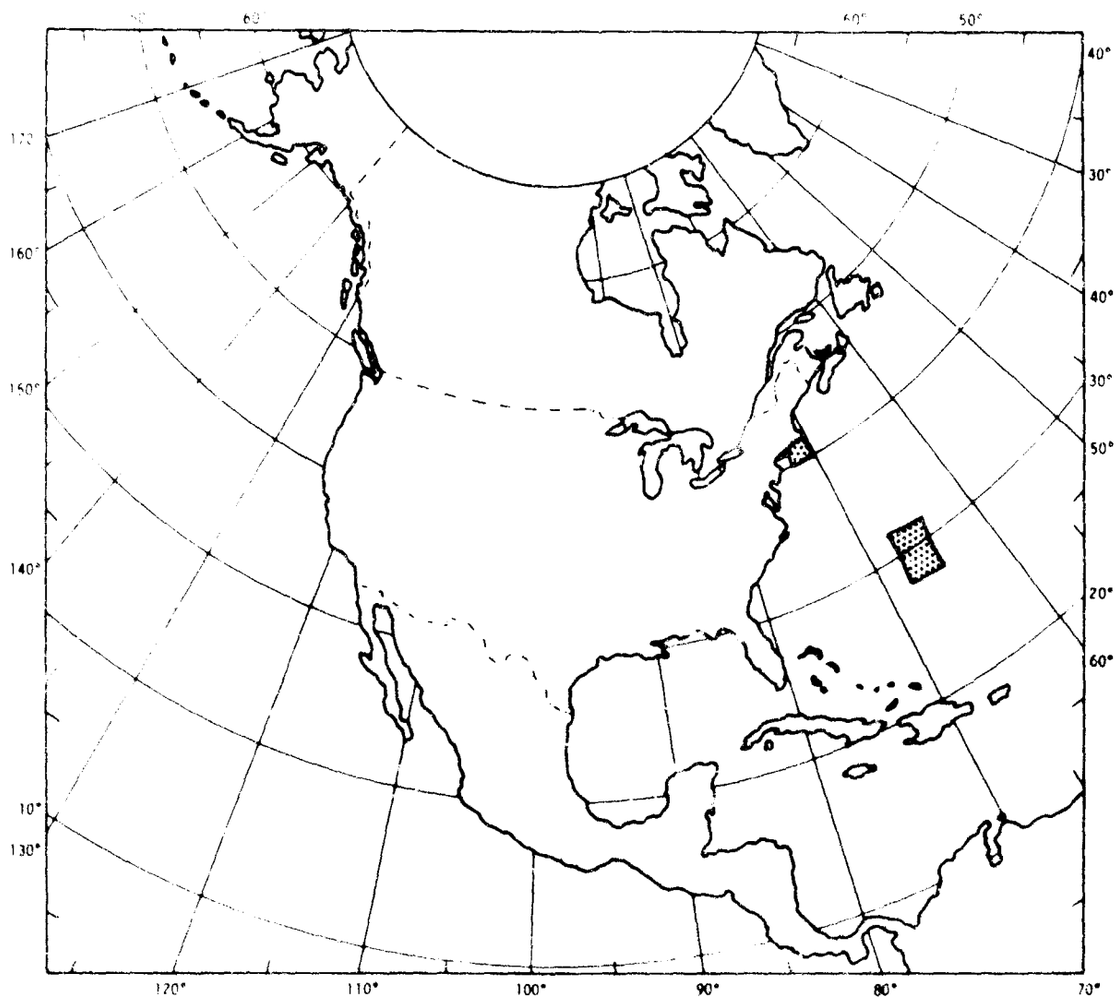
- Area = U.S. East Coast Cont. Shelf and Deeper Water Within Telemetry Distance of Land
- X, Y Spacing = 4 Sites in a Square 20 n. mi. Apart
- Total Observation Sites Required = 4 at a Time



AMO #80—USN, Marine Eng. Lab.—Geomagnetic noise study.

Legend:

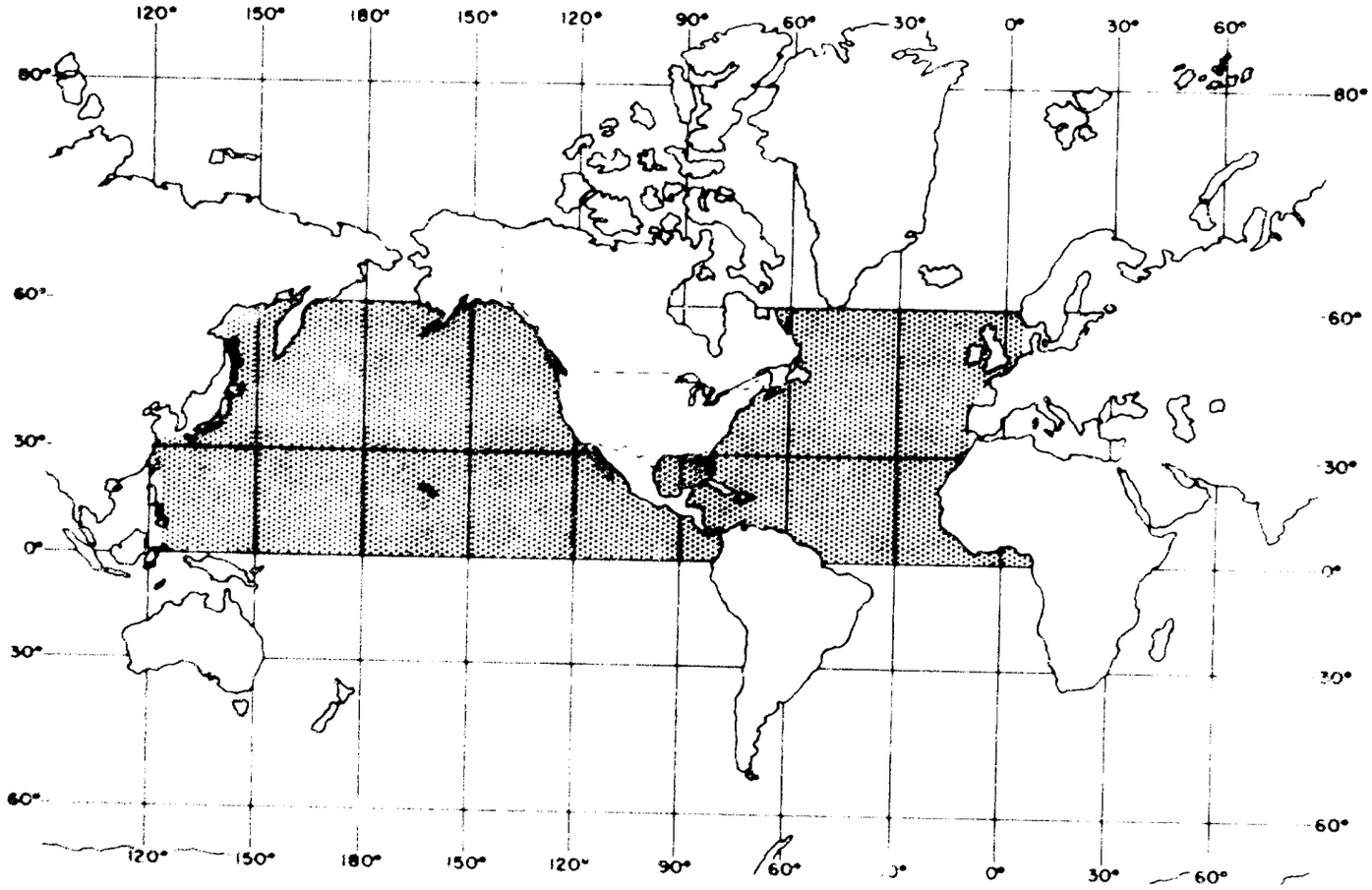
- Area = Block Island Sound and South of Bermuda Out to 150 n. mi.
- X, Y Spacing = 9 n. mi. and Variable
- Total Observation Sites Required = 20 (Estimated)



AMO #81—USN, Underwater Sound Lab.—Acoustic raypath studies.

Legend:

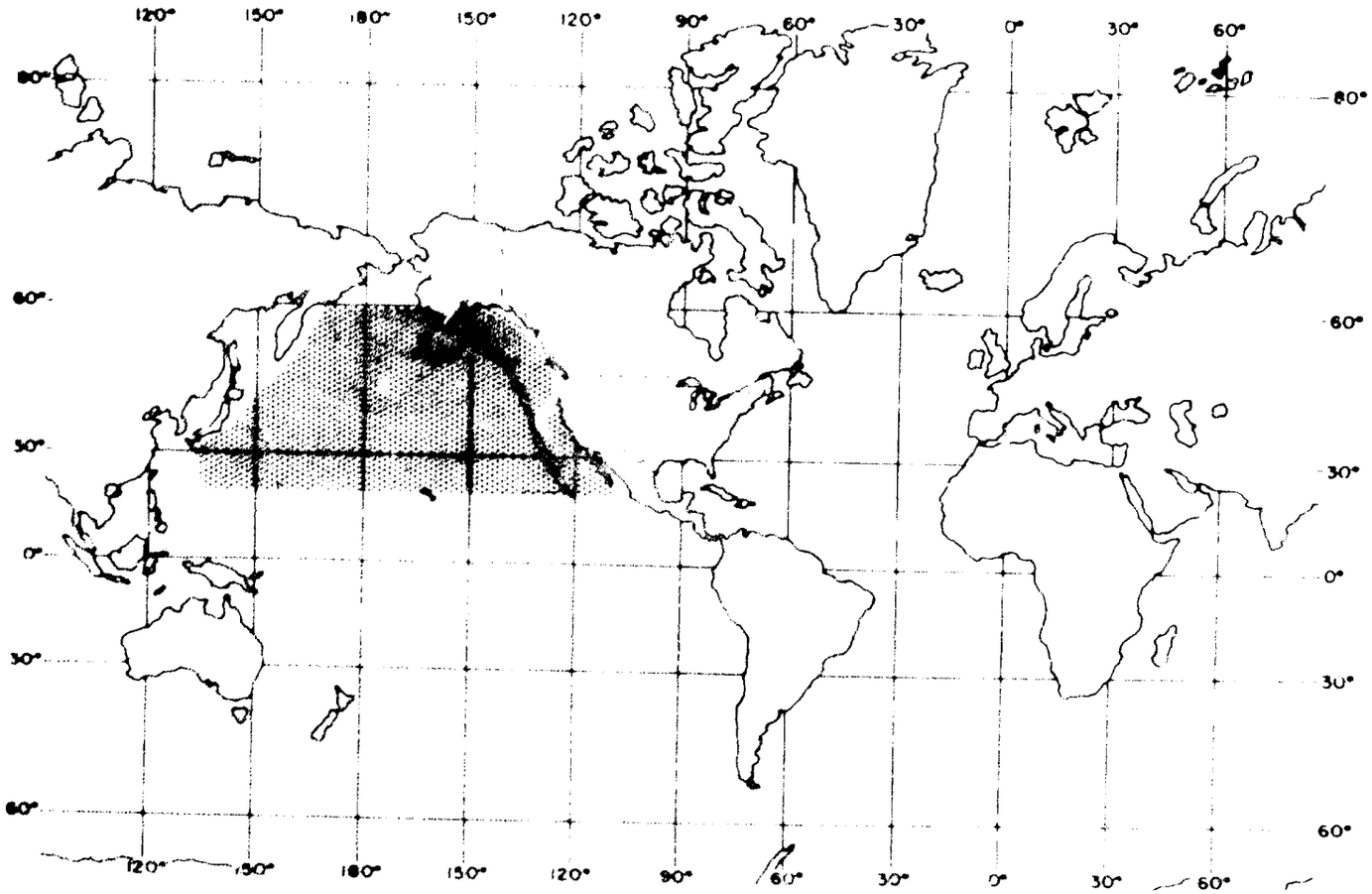
- Area = North Atlantic and North Pacific
- X, Y Spacing = 100 to 600 n. mi.
- Total Observation Sites Required = 199



AMO #82—USN, NSR & DC—Test seaworthiness of ships.

Legend:

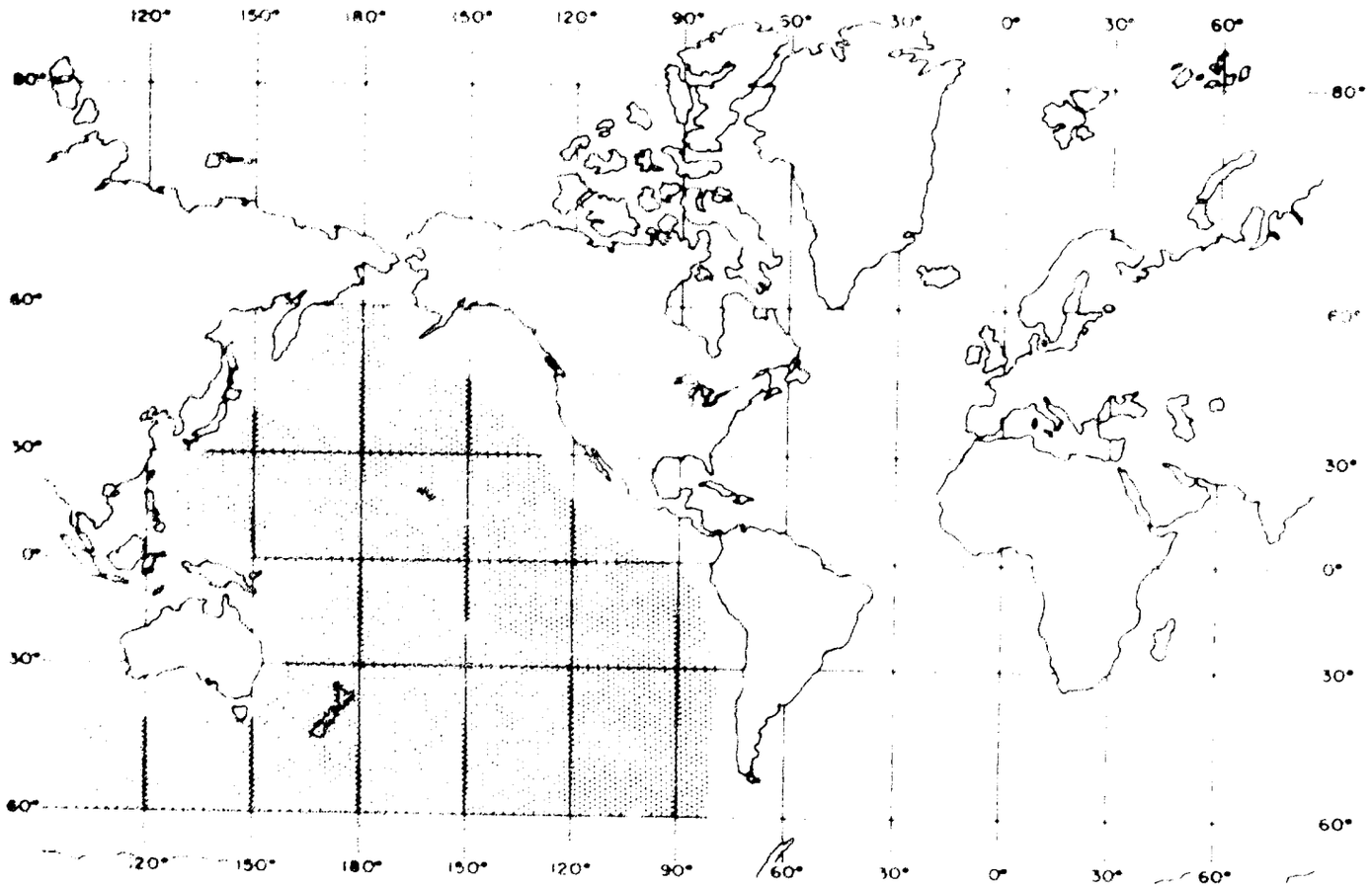
- Area = Pacific 20° N to 60° N and 110° W to 130° E
- X, Y Spacing = 500 n. mi. > 400 n. mi. from U.S. Coast, 100 n. mi. < 400 n. mi. from U.S. Coast
- Total Observation Sites Required = 133



AMO #54—ONR Scripps Inst. of Oceanography—Basic research on N. Pacific and atmosphere.

Legend:

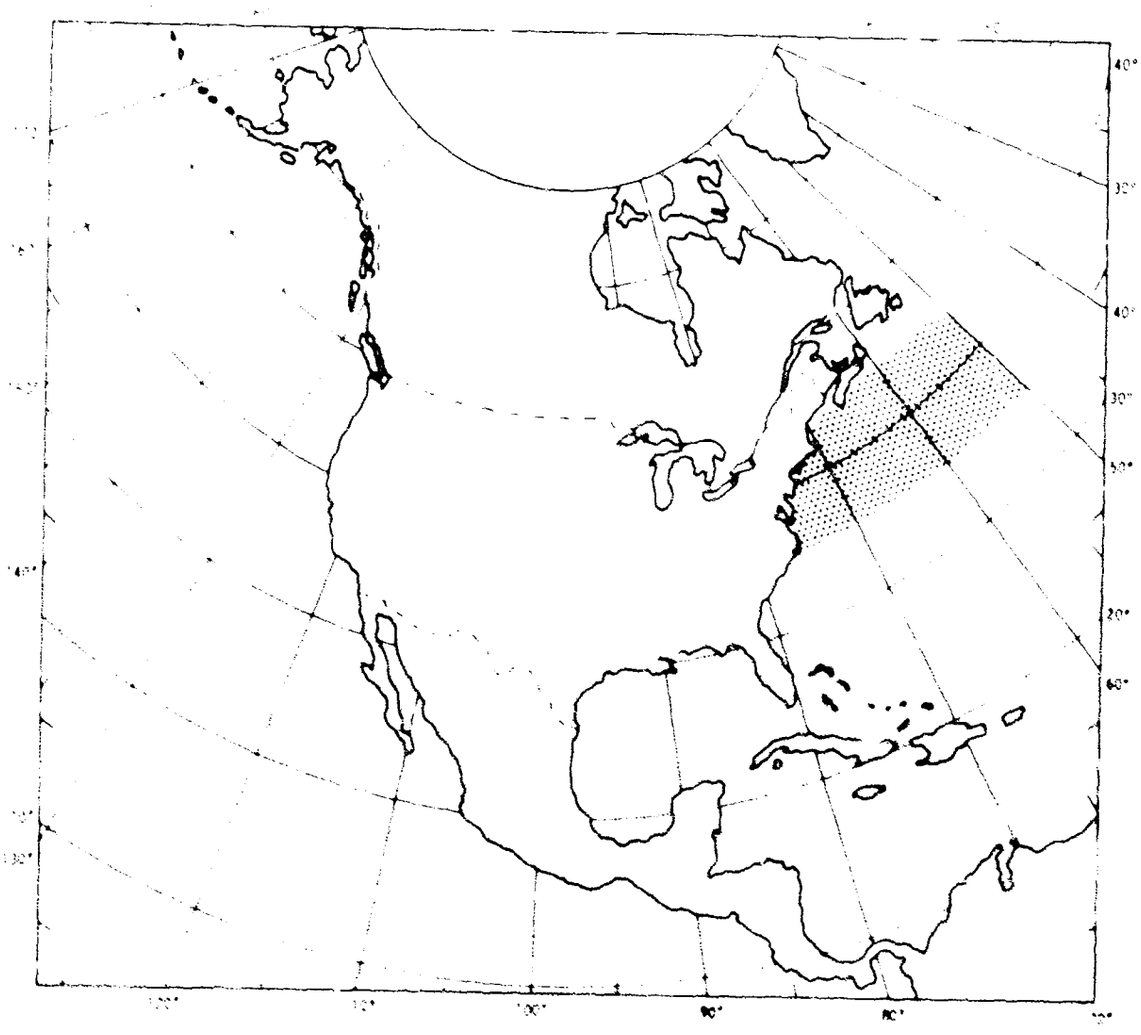
- Area = Deep Pacific, Primarily Deep Currents
- X, Y Spacing = Unknown
- Total Observation Sites Required = Unknown



AMO #85—AEC, Scripps Inst. of Oceanography—Research on near bottom currents.

Legend:

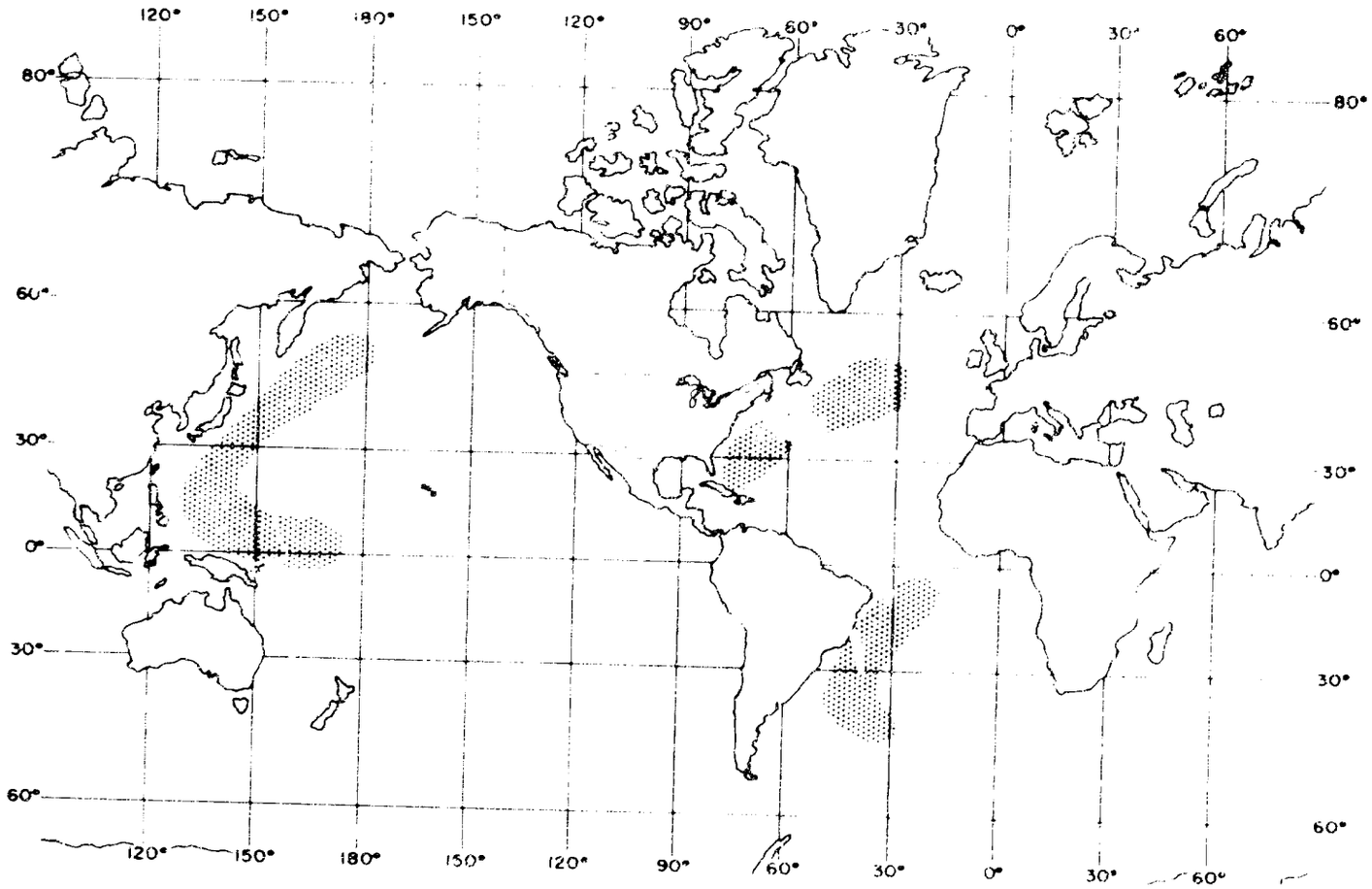
- Area = 35° N to 45° N and 50° W to 75° W
- X, Y Spacing = 10 n. mi. in Gulf Stream, 60 n. mi. Outside Gulf Stream
- Total Observation Sites Required = 750 (Estimated)



AMO #6—ONR, Woods Hole Oceanographic Institution—Research on Gulf Stream.

Legend:

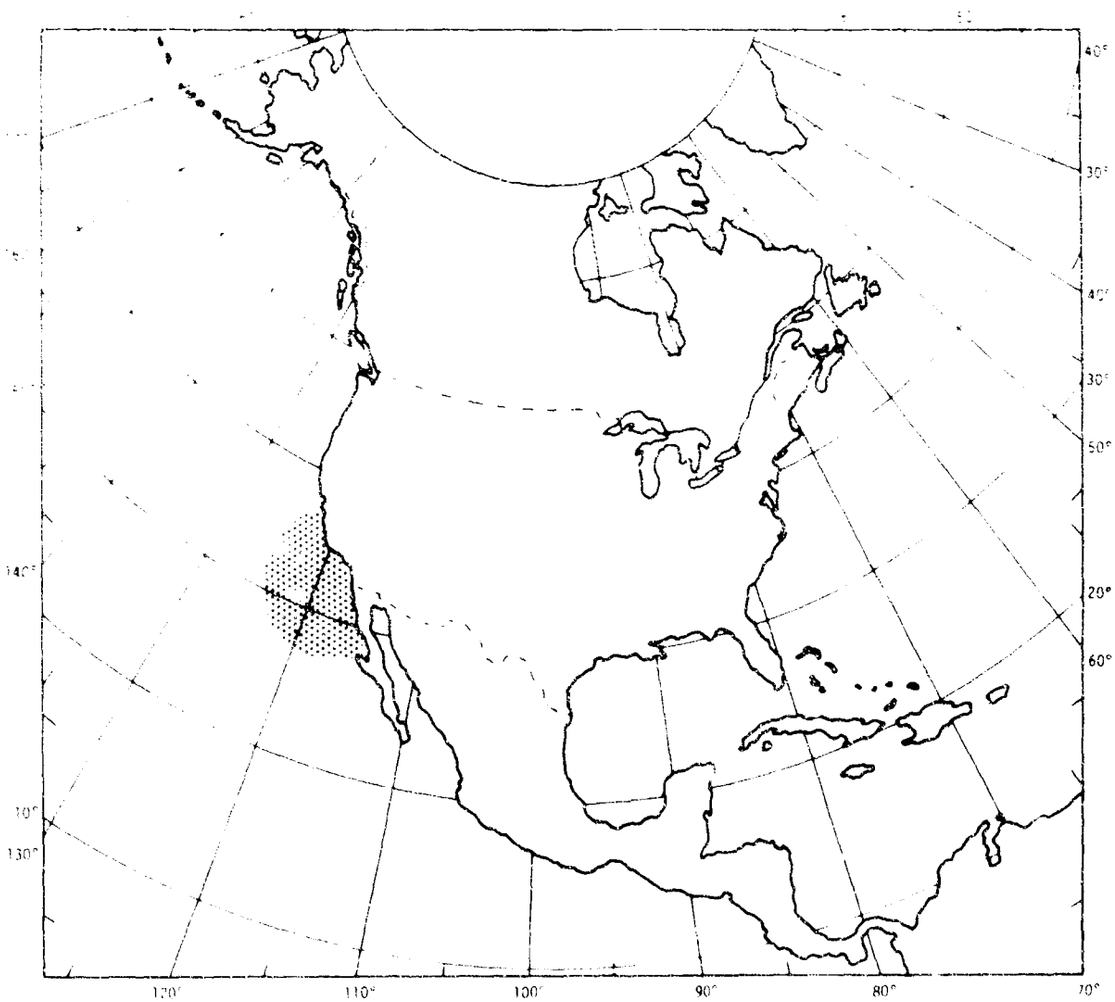
- Area = Major Currents of the World
- X, Y Spacing = 1/10 of Maximum Stream Width
- Total Observation Sites Required = 600 (Estimated)



AMO #87—ONR, Nova U.—Measure of velocity and mass fields in strong currents.

Legend:

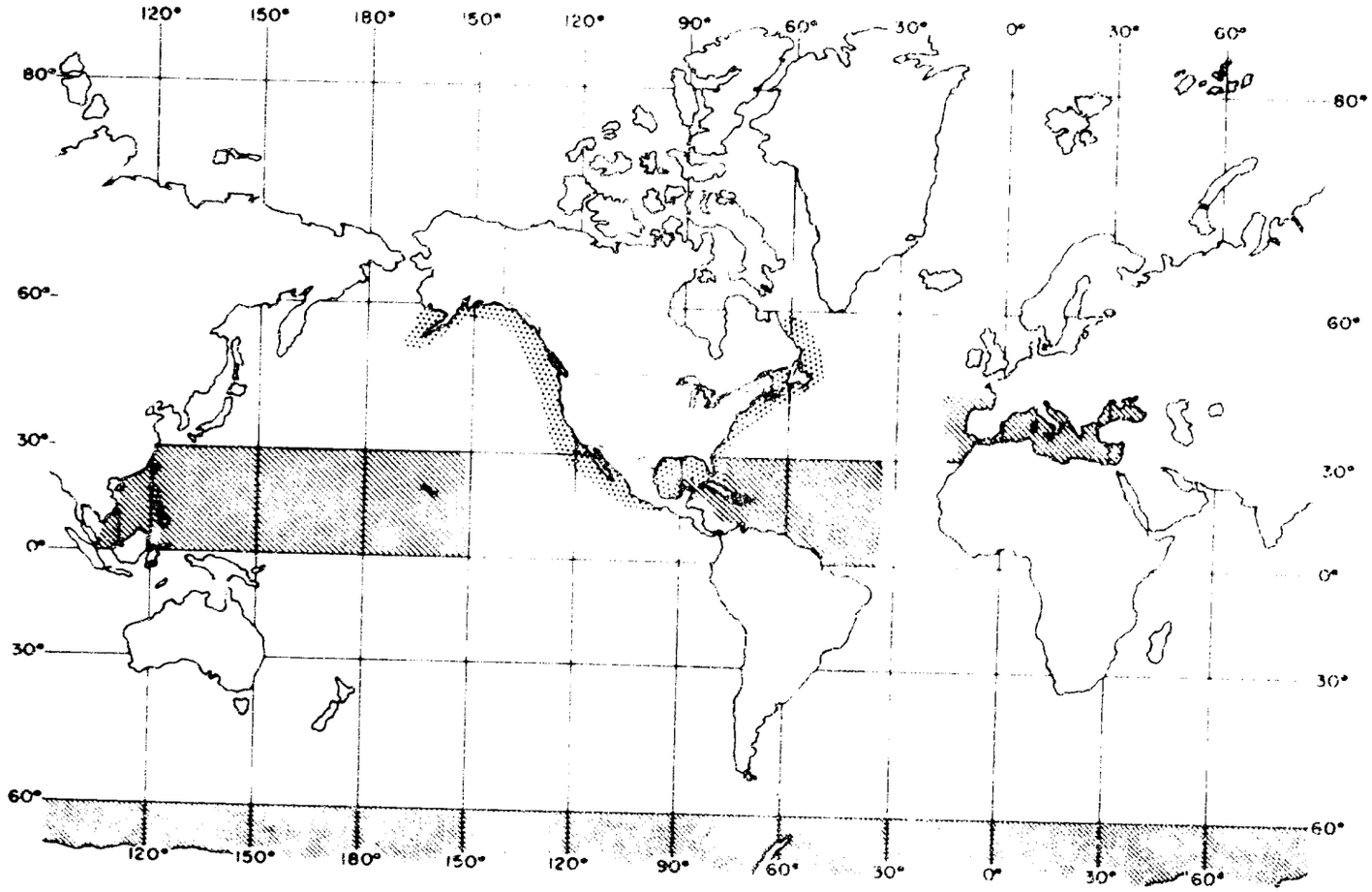
- Area = San Diego to 300 n. mi. Out in a Circle
- X, Y Spacing = 10 n. mi. or Just 1 Site
- Total Observation Sites Required = 1



AMO #88—USN, NUWC—Research on underwater sound propagation patterns.

Legend:

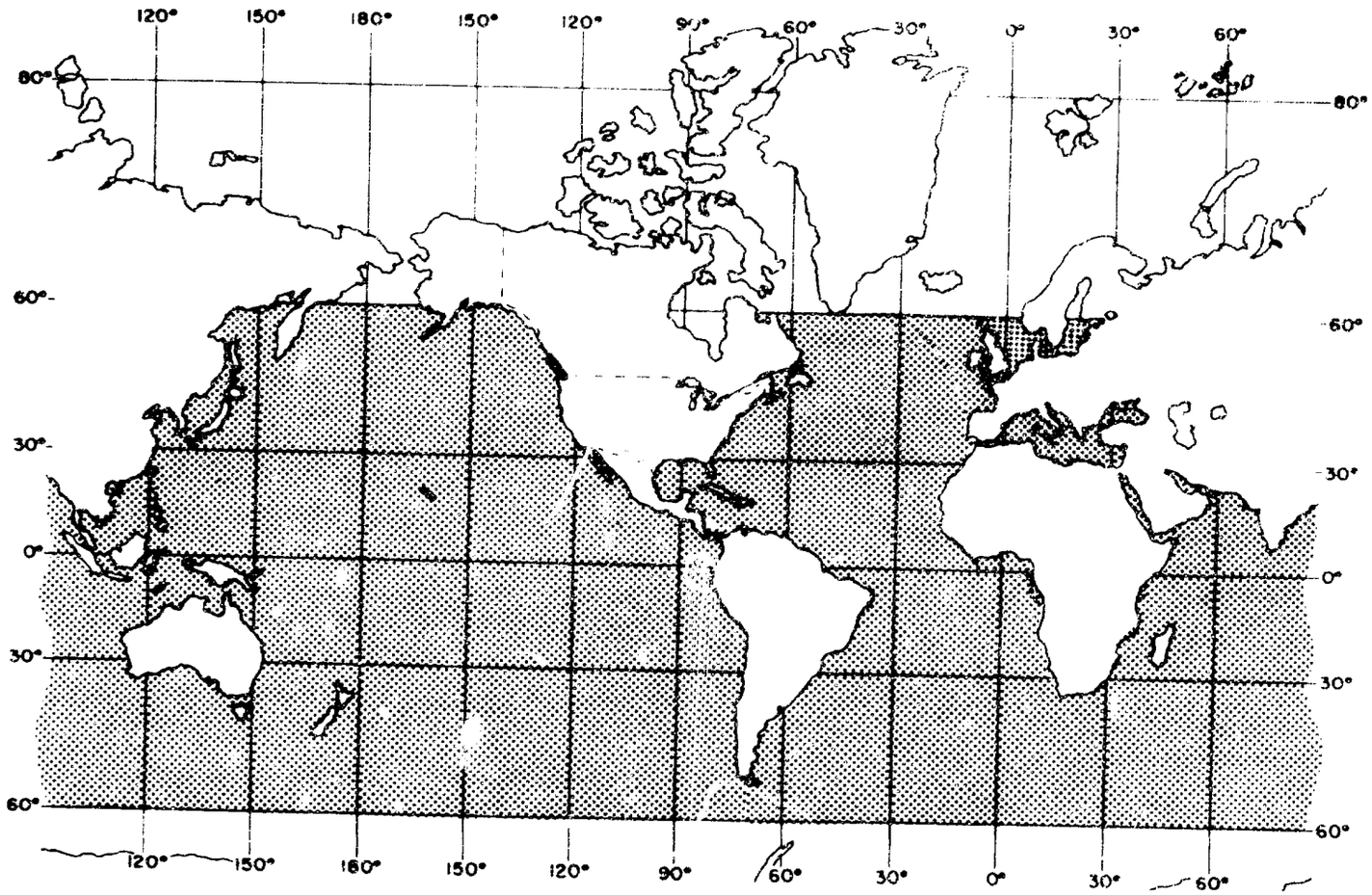
- Area = CNA Out to 150 n. mi., Gulf of Mexico, 0 to 30° N and 150° W to 120° E, 0 to 30° N and 35° W to North America, 30° N to 45° N and 15° W to 40° E, Plus Antarctic
- X, Y Spacing = 100 to 500 n. mi. in all areas, 30 to 60 n. mi., 30 to 100 n. mi. and .1 n. mi. in Special Locations
- Total Observation Sites Required = 1500 (Estimated)



AMO #89—USN, NAVAIRSYSCOM—Develop techniques to support NWS.

Legend:

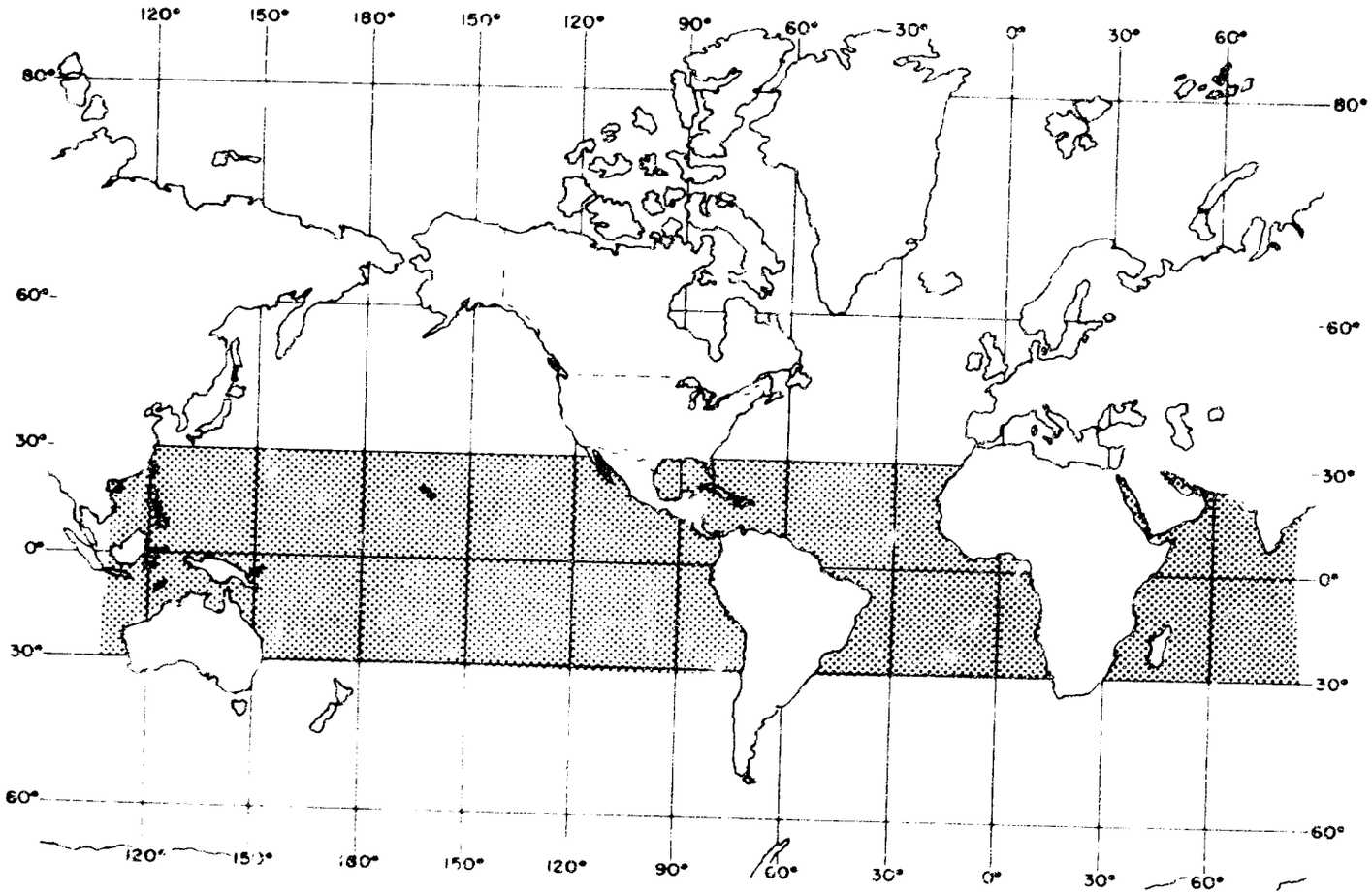
- Area = World Oceans
- X, Y Spacing = Varies - More Intense in Strong Wind and Current Gradients
- Total Observation Sites Required = 1200



AMO #92—MSF, MIT—General circulation of the atmosphere and oceans.

Legend:

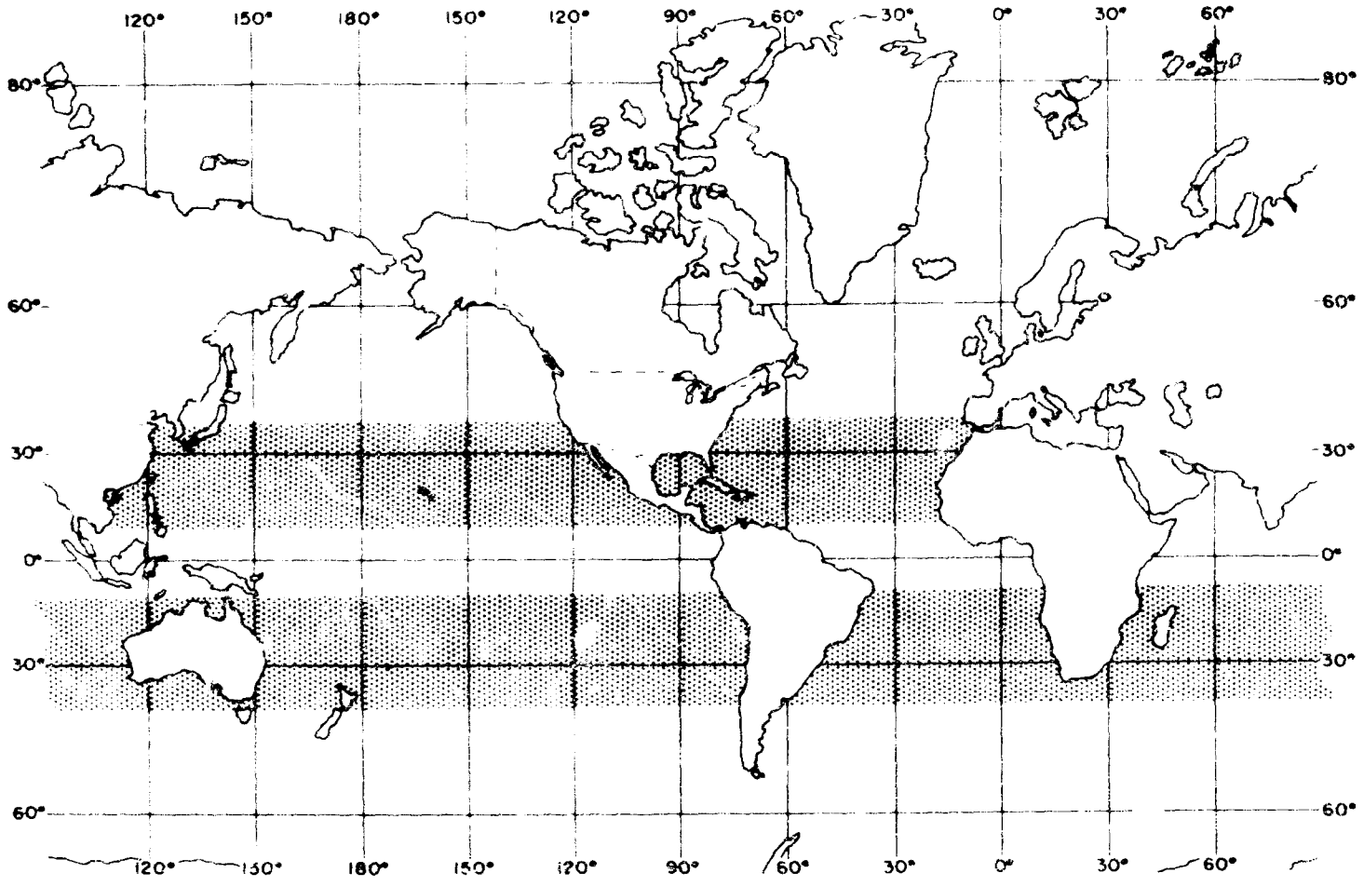
- Area = Tropical, Subtropical and Mid-Latitudes of World Oceans
- X, Y Spacing = 4 Sites in 4 min. Squares Scattered Throughout Area of Interest
- Total Observation Sites Required = Unknown



AMO #93—NSF, MIT—Research in internal gravity waves.

Legend:

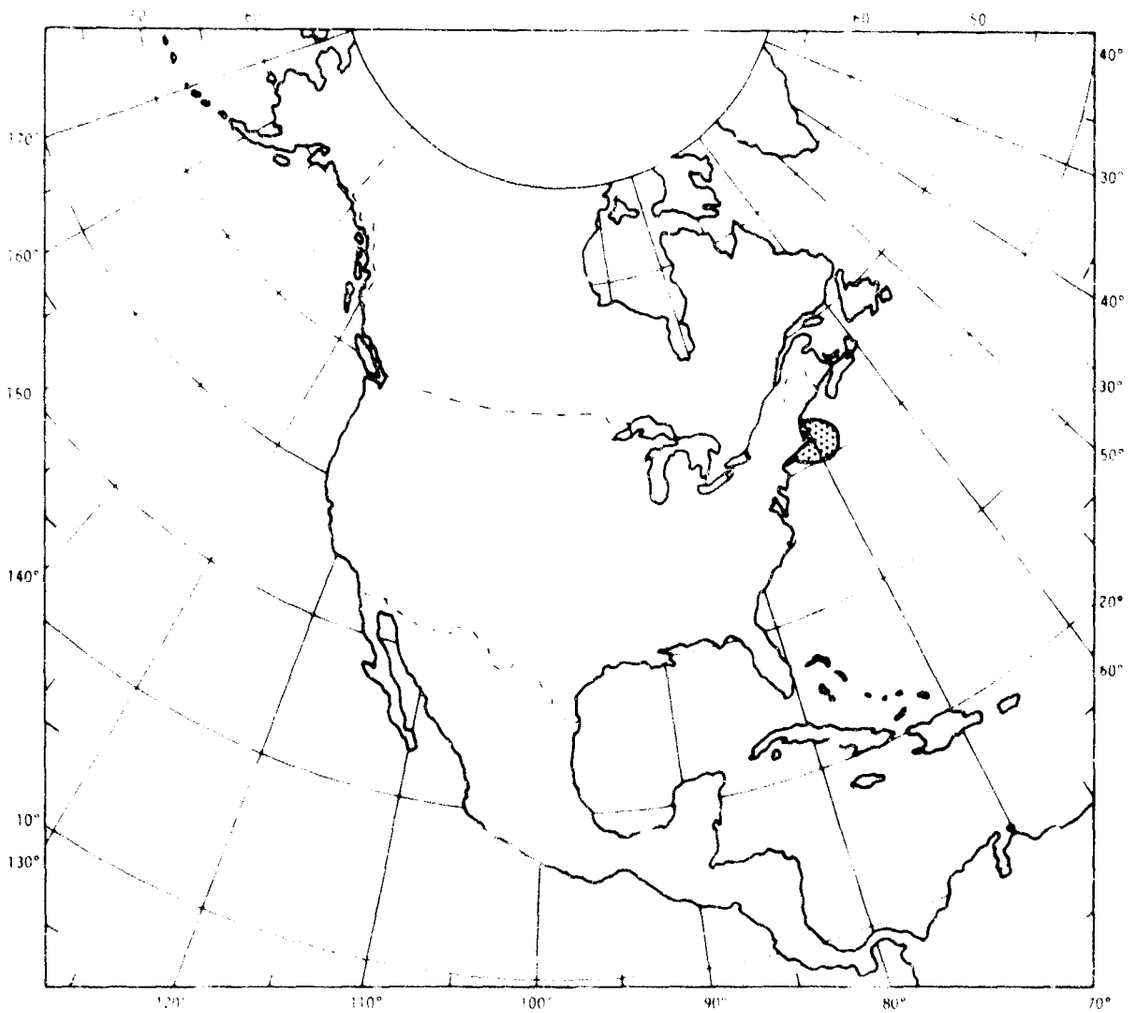
- Area = Mid-Latitude of World Oceans
- X, Y Spacing = 30 Sites in a 4° Square, 600 n. mi Between Squares
- Total Observation Sites Required = 500 (Estimated)



AMO #94—NSF, MIT—Research on Rossby waves.

Legend:

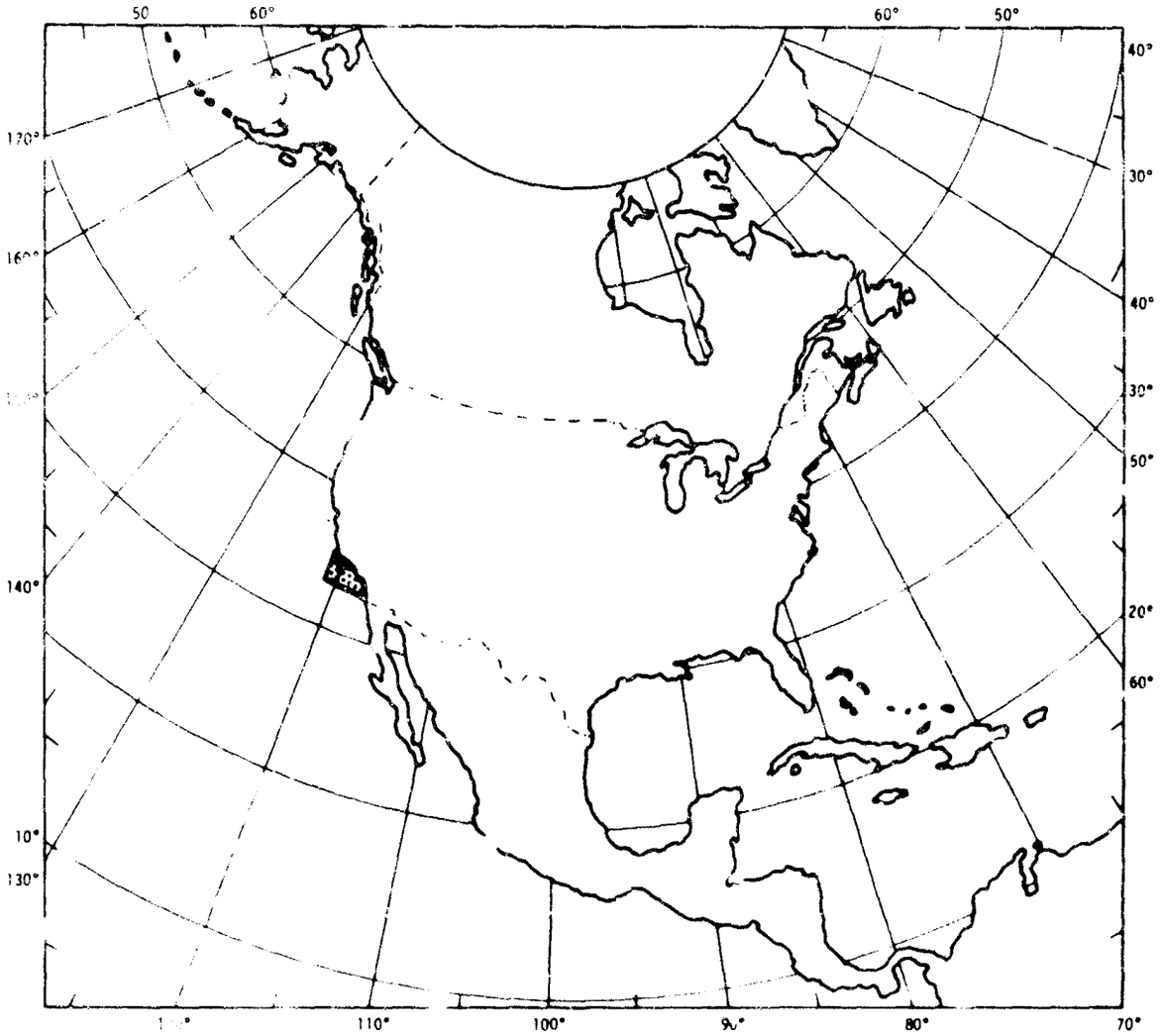
- Area = Buzzards Bay Area
- X, Y Spacing = 1 Point Only
- Total Observation Sites Required = 1



AMO #95—NSF, MIT—Research on air/sea boundary layer.

Legend:

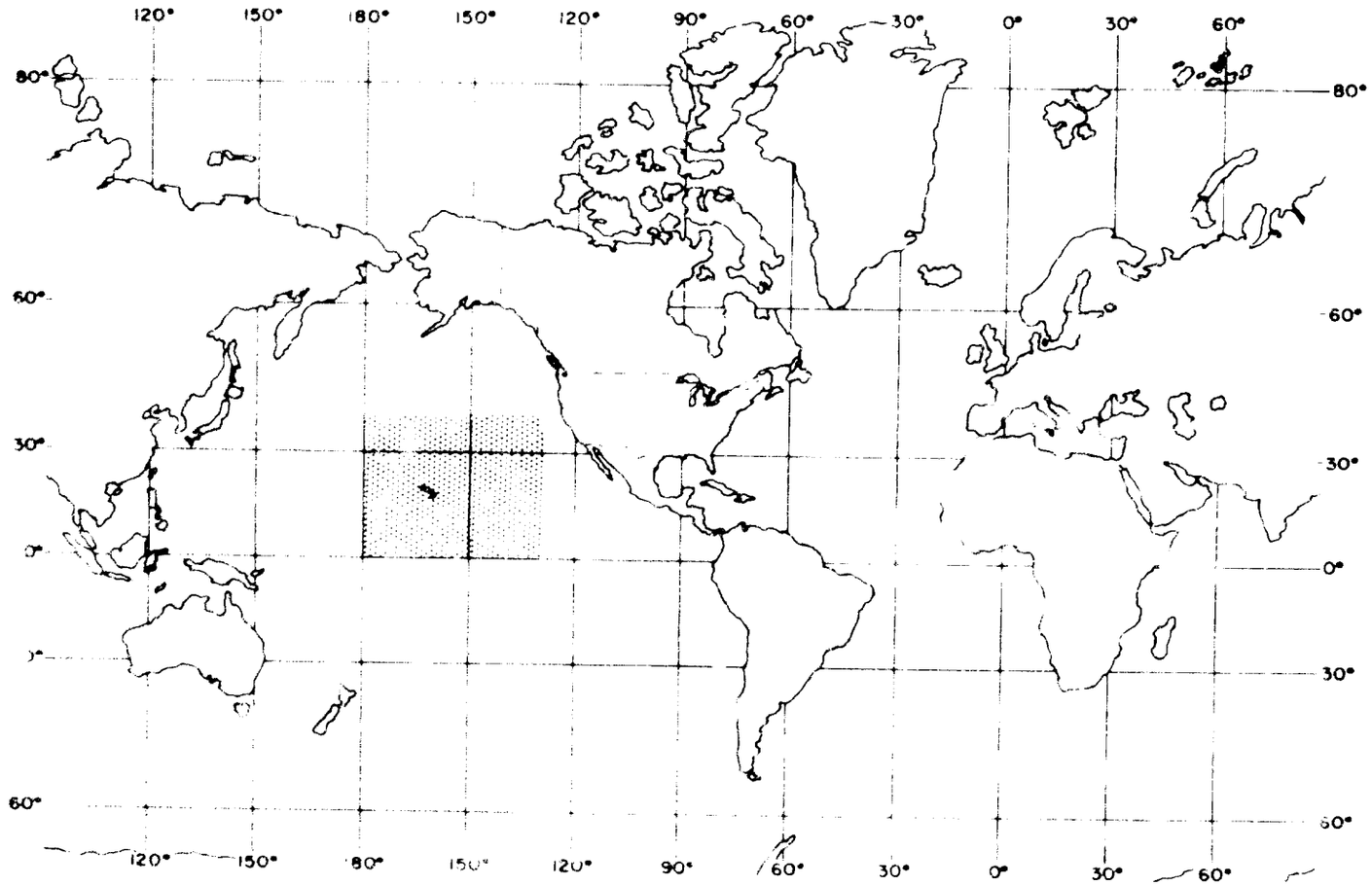
- Area = Vicinity of Santa Barbara Channel Islands, California
- X, Y Spacing = 1 Point Only
- Total Observation Sites Required - 1



AMO #97—Naval Civil Eng. Lab.—Site survey for manned underwater station.

Legend:

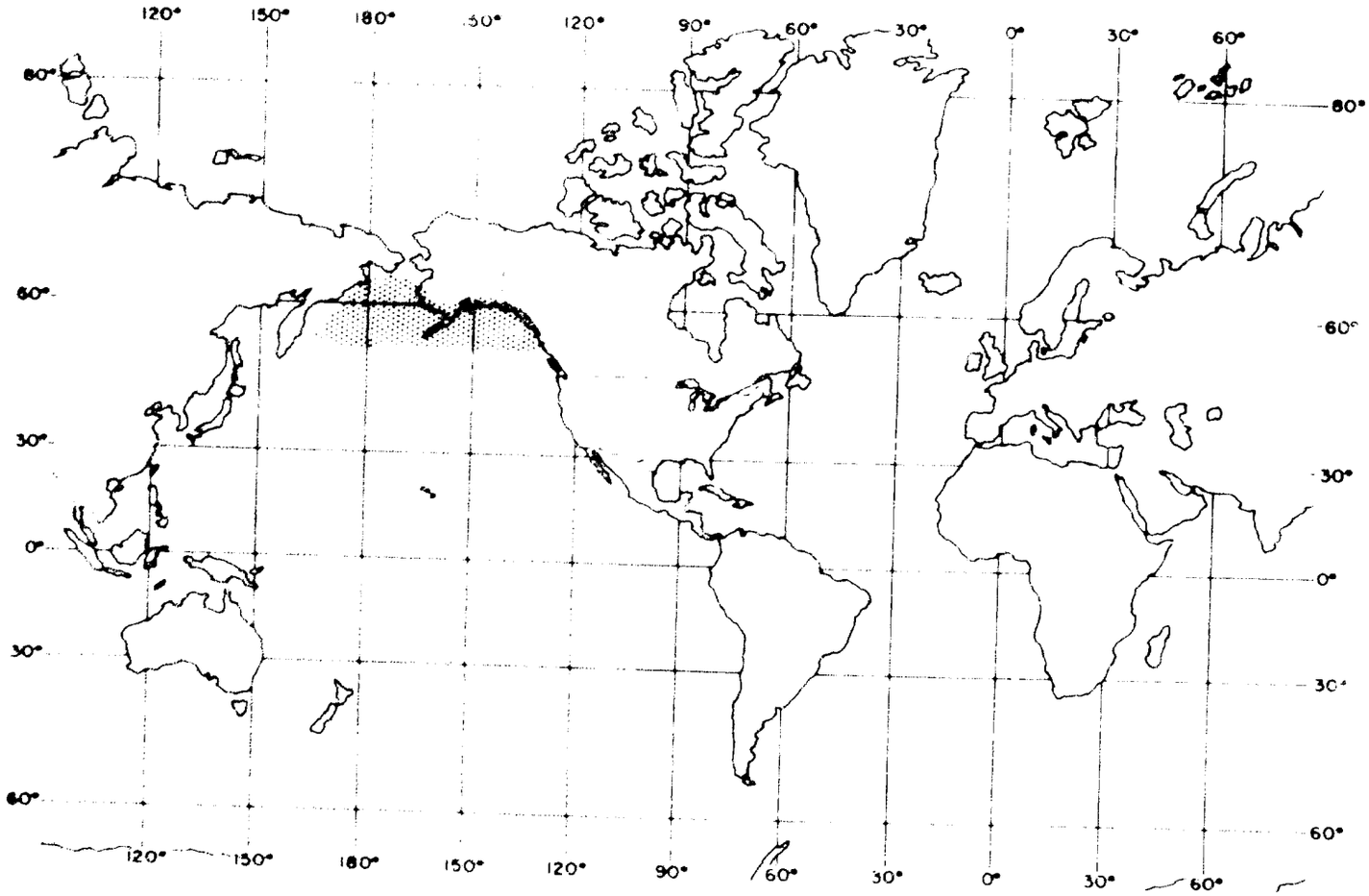
- Area = Pacific 0 to 35° N and 130° W to 180°
- X, Y Spacing = 60 n. mi in Major Currents
  500 to 800 n. mi Elsewhere
- Total Observation Sites Required = 100 (Estimated)



AMO #98—BCF, Honolulu—Basic water mass studies.

Legend:

- Area = Estuaries, Cont. Shelf in G[illegible] of Alaska, Bering Sea, and Deep Ocean N of 50° N and E of 165° E
- X, Y Spacing = A Few Miles in Estuaries
  50 to 300 n. mi in Coastal Waters
  300 to 1000 n. mi in Deeper Waters
- Total Observation Sites Required 72



AMO#99—BCF, Alaska—Research on environment of fish in Alaskan waters.

APPENDIX IV

ASSESSMENT SHEETS FOR 1968 REFINED STATEMENTS OF DATA REQUIREMENTS

Part A Operational Activities

Part B Research Activities

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Reviewed 20 Aug 68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir.	Air temp	Atmos elect	Atmos. press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) / N. America Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 50°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 18 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	[illegible] kts or 1%
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling intensity	X, Y	≤ 600 n. mi / 100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs / 2 hrs																			
Ob. synch	X, Y, (Z)	.6 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # : REQUIREMENTS U.S. Air Force (AWS)—Support for Recovery of Aerospace Vehicles

Geographic location		3 Recovery Areas in Atl., 3 Areas and 2 Lunar Recov. Lines in Pac. (Recov. Areas ~ 480 n. mi. Diam.)																			
Vertical layer		Sfc				Sfc					Sfc					Sfc			Sfc		
Range		0 to 360°	0 to 10 kts	10 to 40 ‰		0 to 40°C					1 to 25 ft	1 to 30 sec	0 to 360°	0 to 40°C		900 to 1050 mb			0-12 in./hr	0 to 360°	0 to 30 kts
Maximum error		10°	0.9 kts	3 ‰		1.5°C				1 ft < 15 ft 3 ft > 15 ft		2.1 sec	30°	0.3°C		0.3 mb			0.01 in./hr	5°	3 kts
Duration of ob		10 min	10 min	5 min		5 min					10 min			5 min		Inst			Inst	5 min	[illegible] min
Sampling intensity	X, Y	200 n. mi				200 n. mi					200 n. mi					200 n. mi			200 n. mi		
	Z	N/A				N/A					N/A					N/A			N/A		
	Time	1 to 3 hrs during operations 6 hrs when no activity																			
Ob. synch	X, Y	10 min				10 min					10 min					10 min			10 min		
	Z	N/A				N/A					N/A					N/A			N/A		

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The 200 n. mi X, Y spacing: Tentative "system" has initial spacing of 600 n. mi.
- The requirements for 1 (to 3) hr ob during operations. Could be met by a minor "system" operational change. "System" expected to have adequate flexibility.

Requirements not met and why: Total Cloud Amount: Judged better done by other means
Rawinsonde Data (P, RH, T and Wind), Refractive Index, and Visibility. Considered beyond 5-yr buoy SOA

Page

REFINED AMO # 1 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 29 Aug [illegible]

Parameter		Total cloud amount											
Geo. location		Same as page 1											
Vertical layer		Total atmos											
Range		0 to 10/10											
Maximum error		30%											
Duration of ob		1 min											
Sampling intensity	X, Y	200 n. mi											
	Z	N/A											
	Time	6 hrs											
Ob. synch	X, Y	10 min											
	Z	N/A											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Refractive index	Visibility	Rawinsonde (R. H., density, air temperature, air pressure, + wind velocity)								
Geo. location		Same as page 1										
Vertical layer		Sfc to 45,000 m	→	→								
Range		50 n to 350 n	0 to 20 mi	Std								
Maximum error		3.0 n	400 m	Std								
Duration of ob.		1 min	1 min	5 min								
Sampling intensity	X, Y	200 n. mi	→	→								
	Z	150 m	1000 m	4, 16, 49, 300 + sea ; 00 m								
	Time	6 hrs	→	→								
Ob. synch	X, Y	1 hr	→	→								
	Z	3 hrs	→	→								

Remarks

Page

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

Revised 20 Aug '68

1 TENTATIVELY PROPOSED NOBS SENSING CAPABILITIES

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew p	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.25 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	960 to 1060 mb	25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	5°	[illegible] kts or 1%
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 2A REQUIREMENTS U.S. Air Force (AWS)—Support Nat. Def. Weapons and Tactics RDT + E at Eglin AFB

Geographic location		Gulf Coast South to 25°N and from 90°W to 84°W, plus 5 Specified Locations in this Area																			
Vertical layer		Sfc to 5000 m depth or gulf floor									Sfc										
Range		0° to 360°	0 to 10 kts	0 to 40 00	4500 to 5800 fps	0 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 db to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-5 to 40°C	0 to 10 kv	940 to 1060 mb	-20 to 35°C	0.1 to 2.0 ly/m	0-2.0 in./hr	0 to 360°	0 to 160 kts or cf
Maximum error		5°	0.03 kts or 1%	0.05 0/00	1 fps or 0.02 0/00	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	01 kv or 01%	0.1 mb or 0.01%	0.1°C	1%	0.01 in./hr	5°	[illegible] kts or cf
Duration of ob.		10 min																			
Sampling Intensity	X, Y	150 n. mi																			
	Z	Sfc only			IAPSO std lvls						N/A										
	Time	3 hrs																			
Ob. synch	X, Y	10 min																			
	Z	N/A			1 min						N/A										

3 RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above.

Requirements partially met and why

Requirements not met and why: Rawinsonde Data (P, RH, T, and Wind), Propagation Loss, Refractive Index, and upper-air Visibility. Considered beyond 5-yr buoy SOA

REFINED AMC # 2A REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter												
Geo location												
Vertical layer												
Range												
Maximum error												
Duration of ob												
Sampling intensity	X, Y											
	Z											
	Time											
Ob synch	X, Y											
	Z											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Refractive index	Visibility	Rawinsonde	Propagation loss							
Geo location		N. Gulf of Mexico										
Vertical layer		Sfc to 7,000 ft		→	→							
Range		50 to 350 N units	0 to 26 mi	Std	0 to 20 db/n. mi							
Maximum error		30 N units	1%	IRIG std	1 db							
Duration of ob.		10 min	10 min	Std	10 min							
Sampling intensity	X, Y	150 n. mi	→	→	→							
	Z	500 ft	3000 ft	1000 ft	1000 ft							
	Time	6 hrs	6 hrs	6 hrs	6 hrs							
Ob synch	X, Y	10 mi	10 min	10 min	10 min							
	Z	1 min	1 min	1 min	1 min							

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug [illegible]

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir.	Curr speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Amb mi [illegible]	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Inc[illegible]	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean [illegible] to 60°S/N American Coast out to 400 n mi																			
Vertical layer		Surface to 50 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 350°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2 0 ly/m	-[illegible] to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1050 mb	25 to 40°C	0.01 to 2.0 ly/m	[illegible] in/hr	0 to 360°	[illegible]
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in/hr	2°	[illegible]
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n mi/100–150 n mi																			
	Z	20 Std. LAPBO levels (+ near bottom)								2 levels			Surface								
	Time	3 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 2B REQUIREMENTS U.S. Air Force (AWS)—Support Western Missile Test Range and "WINDS"

Geographic location		Waters ~ 1 Mile Offshore from Vandenberg AFB																			
Vertical layer														Sfc to 12 ft			Sfc to 12 ft				
Range														-25 to 60°C			25 to 40°C			0 to 360°	
Maximum error														0.1°C			0.2°C				
Duration of ob.														Inst			Inst				
Sampling Intensity	X, Y													3 pts			3 pts				
	Z													6 - 12 ft			12 ft				
	Time													Not stated			Not stated				
Ob. synch	X, Y													10 min			10 min				
	Z													N/A			N/A				

(Probably varies with operation)

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why — All requirements listed in 2 above. The 3 required locations are all 1 n. mi offshore and hence in the near-shore region not included in the tentative "states" at this time. In addition the fine X, Y spacing of the 3 pts would be far too stringent for the 100 n. mi CNA spacing which starts 25 n. mi offshore.

Requirements not met and why

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NOW SENSING CAPABILITIES

Revised [illegible]

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Curr dir	Curr speed	Salinity	Sound speed	Water temp	Water depth	Ambient light	Ambient noise	Trans parency	Wave measurements Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Hor visibility	Wind dir	Wind speed
Geographic location	Deep Ocean 40°N to 60°N, American Coast out to 150 n. mi.																		
Vertical layer	Surface to 1000 m depth									Surface			Surface to surface						
Range (5-yr RMA)	0 to 360°	35 to 14 kts	0 to 42.0 gm	4500 to 5600 fps	5 to 40°C	0 to 12,000 m	0 to 1 ly	0 to 2 db	0 to 275 m	0 to 50 ft	4 sec	360°	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max error (5-yr RMA)	5°	0.03 kts or 1%	0.01 0 gm	1 fps	[illegible]	0.1%	1 ly	[illegible]	.25	2 ft or 5%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Duration of ob	Inst or Short period avg (Representative)																		
Sampling intensity X, Y	≤ 600 s or 30-150 n. mi.																		
Sampling intensity Z	20 Rec (AFRC levels / new bottom)						2 levels			Surface									
Sampling intensity Time	4 days/3 yrs																		
Ob synch X, Y, (Z)	10 min, (1 min)																		

*Includes Measurements of Swells

2. REFINED AND/OR 3. REQUIREMENTS (U.S. Air Force (AFSC) Support Global Ops & Defense Scenarios)

Geographic location	Global																		
Vertical layer			Sfc		Sfc					Sfc			Sfc	Sfc			Sfc		
Range			15 to 49 gm/g		5 to 35°C					0 to 1000 ft	0 to 4 sec	0 to 360°	15 to 40°C	300 to 1060 mb	20 to 40°C		[illegible]		
Maximum error			10%		1°C					6 ft	2 sec	20°	1°C	1 mb	[illegible]		[illegible]		
Duration of ob			Inst		Inst					Inst			Inst	Inst	Inst		Inst	Inst	
Sampling intensity X, Y			6 n. mi.		8 n. mi.					600 n. mi.			600 n. mi.	600 n. mi.			600 n. mi.		
Sampling intensity Z			N/A		N/A					N/A			N/A	N/A			N/A		
Sampling intensity Time			12 hrs		12 hrs					12 hrs			12 hrs	12 hrs			12 hrs		
Ob synch X, Y			30 min		30 min					30 min			30 min	30 min			30 min		
Ob synch Z			N/A		N/A					N/A			N/A	N/A			N/A		

4. RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above

Requirements partially met and why: Reasonable data [illegible] and Wind [illegible] [illegible] by end 1 yr [illegible]

Requirements not met and why:

REVISED ABS 9 3 REQUIREMENTS (Continued)

SURVEY AREA: PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 10 Aug

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X Y												
	Z												
	Time												
Ob. errors	X Y												
	Z												

Remarks

PARAMETERS CONSIDERED BEYOND THE STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter	Requirements												
Geo location	(Global)												
Vertical layer	Up to 1000-300 ft												
Range	Std												
Maximum error	Std												
Duration of ob	Least												
Sampling intensity	X Y	100 n mi											
	Z	Sampling rate variable [illegible] n mi											
	Time	12 hrs											
Ob. errors	X Y	50 m											
	Z	Not stated											

Remarks

Page

ASSESSMENT SHEET FOR [illegible] DATA REQUIREMENTS

Revised [illegible] Aug. 68

1. TENTATIVELY PROPOSED [illegible] SENSING CAPABILITIES

Parameters / Characteristics		Air temp.	Wind speed	Salinity	Sound speed	Water temp.	[illegible] depth	Ambient [illegible]	[illegible]	[illegible]	Wave [illegible] [illegible]	[illegible]	[illegible]	METEOROLOGICAL [illegible]
Geographic location		Deep ocean [illegible] to [illegible] American coast [illegible]												
Vertical layer		Surface to 5000 m depth									Surface			[illegible] to surface
Range		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max error		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Duration of ob.		Inst. or Short period avg. - Representative												
Sampling interval	X, Y	[illegible]												
	Z	20 [illegible] levels [illegible]						[illegible] levels			Surface			
	Time	[illegible] hrs												
Ob. sync.	X, Y, Z	10 min. [illegible] min.												

* [illegible] measurements of [illegible]

2. REFINED [illegible] REQUIREMENTS [illegible]

Geographic location		Pacific coast [illegible]									
Vertical layer		[illegible]			[illegible]			[illegible]			
Range		[illegible]	[illegible]	[illegible]	[illegible]			[illegible]			
Maximum error		[illegible]	[illegible]	[illegible]	[illegible]			[illegible]			
[illegible] of ob.		[illegible]	[illegible]	[illegible] min	5 min			[illegible]			
Sampling interval	X, Y	[illegible]									
	Z	[illegible]			[illegible]			[illegible]			
	Time	6 hrs			6 hrs			[illegible]			
[illegible]	X, Y	30 min			[illegible]			[illegible]			
	Z	5 min			5 min			[illegible]			

3. RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in [illegible] above for the [illegible]

Requirements partially met and why: [illegible]

- The [illegible] [illegible]
- The [illegible] [illegible]

Requirements not met and why:

[illegible]

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

Revised 20 Aug '68

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elec	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. America Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (3-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1098 mb	-25 to 40°C	0.01 to 2.0 ly/m	0.12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 5%
Duration of ob.		Inst. or short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	26 Std. LAPSO levels (+ near bottom)								2 levels			Surface								
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 19 REQUIREMENTS ECF, Washington, D.C.—Synoptic Climatology

Geographic location		Pacific Coast 30°S to Alaska/Pacific Coast to 160°E, 30°S to Alaska																			
Vertical layer		Sfc to 625 m			Sfc to 825 m									Sfc							
Range		0 to 360°	0.05 to 10 kts	0 to 42 0/00	-5 to 40°C									25 to 60°C							
Maximum error		5°	0.03 kts or 1%	0.01 0/00	0.01°C									1°C							
Duration of ob.		10 min or less			≤ 10 min									≤ 10 min							
Sampling Intensity	X, Y	500 to 600 n. mi in DO; 100 to 240 n. mi in CNA *			500 to 600 / 100 to 240 n. mi									500 to 600 / 100 to 240 n. mi							
	Z	LAPSO std lvls			LAPSO std lvls									N/A							
	Time	6 hrs			6 hrs									6 hrs							
Ob. synch	X, Y	30 min			30 min									30 min							
	Z	5 min			5 min									N/A							

3. RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above.
Current measurement capability of the proposed "system" will meet current transport requirements

Requirements partially met and why:

Requirements not met and why: Constant Pressure Surface (1000 and 700 mb) Heights: Considered beyond 5-yr buoy SOA

*600 n. mi X, Y spacing for initial tentative "system" agreed upon during telecon on 7/17/68 with Mr. King (this was in view of initial "system" requirement 1600 n. mi by ESSA, USAF, and USN for deep ocean).

Page 1

REFINED AMO # 19 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter													
Geo. location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X, Y												
	Z												
	Time												
Ob. synch.	X, Y												
	Z												

Remarks:

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Constant pressure heights (1000 - 700 mb)											
Geo. location		Same as page 1											
Vertical layer		Sfc to 700 mb											
Range		Not stated											
Maximum error		Not stated											
Duration of ob.		Not stated											
Sampling intensity	X, Y	Same as page 1											
	Z	N/A											
	Time	6 hrs											
Ob. synch.	X, Y	30 min											
	Z	20 min											

Remarks:

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) / N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42.0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 s	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi / 100—150 n. mi																			
	Z	20 Std. IAPSO levels (- near bottom)						2 levels			Surface										
	Time	6 hrs / 3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 23 REQUIREMENTS U.S. Coast Guard--Ocean Station Vessels (6)

Geographic location		N. Hemisphere 4 in Atlantic, 2 in Pacific																			
Vertical layer		Sfc to 5000 m	→					→			Sfc	→		→		Sfc	Sfc			Sfc	Sfc
Range		0 to 360°	0.1 to 8 kts	20 to 40 0/oo	4500 to 5500 fps	-2 to 30°C	0 to 6000 m	0 to 2.0 ly/m			1 to 50 ft	2 to 25 sec	0 to 360°	-15 to 40°C		900 to 1050 mb	-25 to 40°C			0 to 360°	3 to 99 kts
Maximum error		10°	.03 kts or 1%	0.03 0/oo	3 fps	01°C	7 m or 0.5%	1%			0.2 ft or 10%	0.1 sec or 1%	10°	0.5°C		1 mb	0.2°C			10°	0.5 kts or 3%
Duration of ob.		10 min	→					→			10 min	→		→		10 min	10 min			10 min	10 min
Sampling Intensity	X, Y	N/A single pts	→					→			N/A	→		→		N/A	N/A			N/A	N/A
	Z	IAPSO levels - ≤ 50 m (from bottom) *	→					→			N/A	→		→		N/A	N/A			N/A	N/A
	Time	6 hrs	→					→			6 hrs	→		→		6 hrs	6 hrs			6 hrs	6 hrs
Ob. synch	X, Y	30 min	→					→			30 min	→		→		30 min	30 min			30 min	
	Z	30 min	→					→			N/A	→		→		N/A	N/A			N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above.

Requirements partially met and why

Requirements not met and why: Bathymetry — Judged better done by other means
Oxygen — Uncertainty about ob. from buoy unattended for long periods
Rawinsonde Data (P, RH, T and Wind) and Plankton Hauls — Considered beyond 5-yr SOA

*20 Std IAPSO levels are satisfactory but will degrade adjustable interval sampling of Nansen Bottle and std work

REFINED AMO # 25 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen	Bathymetry										
Geo location		Ocean Station Vessels											
Vertical layer		Sfc to 5000 m	Bottom										
Range		0 to 10 ml/l	5 to 5000 m										
Maximum error		0.03 ml/l	2 m										
Duration of ob.		10 min	30 min										
Sampling intensity	X, Y	N/A	Special locations										
	Z	IAPSO lvls - ≤ 50 m from bot	Bottom										
	Time	6 hrs	N/A										
Ob. synch.	X, Y	30 min	N/A										
	Z	30 min	N/A										

Remarks:

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Rawinsonde	Vertical and oblique plankton hauls to 200 m										
Geo location		Ocean Station Vessels											
Vertical layer		Sfc to 100 k ft	Sfc to 200 m										
Range		SOA	Not stated										
Maximum error		SOA	Not stated										
Duration of ob.		Std	30 min										
Sampling intensity	X, Y	Special locations	N/A										
	Z	Std - signif-icant levels	Cont										
	Time	12 hrs	6 hrs										
Ob. synch.	X, Y	SOA	N/A										
	Z	SOA	N/A										

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

Revised 20 Aug '66

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir.	Air temp	Atmos elect	Atmos. press	Dew point	Insolation	Precip rate	Wind dir.	Wind speed
Geographic location	Deep Ocean (60°N to 60°S) / N. American Coast out to 600 n. mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of buoy meet to surface							
Range (5-yr SOA)	0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-60 to 20 db	0 to 95%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	600 to 1095 mb	-35 to 45°C	0.01 to 2.0 ly/m	0.12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)	5°	0.05 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob	Inst. or Short period avg. (Representative)																			
Sampling Intensity X, Y	≤ 60 n mi / 100–150 n mi																			
Sampling Intensity Z	20 std. + PBO levels (+ near bottom)						2 levels			Surface										
Sampling Intensity Time	6 hrs / 3 hrs																			
Ob. synch X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 24 REQUIREMENTS U.S. Coast Guard—Data Acquisition Along Standard Sections

Geographic location	Standard Sections—SEE MAP																			
Vertical layer	Sfc to 5000 m	→								Sfc	→		→		Sfc	Sfc			Sfc	Sfc
Range	0 to 360°	0 to 6 kts	20 to 40 ‰	4500 to 5500 fps	-2 to 30°C	0 to 5000 m	0 to 2.0 ly/m			1 to 50 ft	2 to 25 sec	0 to 360°	-15 to 40°C		900 to 1050 mb	-25 to 40°C			0 to 360°	4 to 99 kts
Maximum error	10°	.03 kts or 1%	0.03 ‰	1 fps	.01°C	2 ft or 5%	1%			0.2 ft or 10%	0.1 sec or 1%	10°	0.5°C		0.5 mb	0.2°C			10°	0.5 kts or 3%
Duration of ob.	10 min	→								10 min	→		→		10 min	10 min			10 min	10 min
Sampling Intensity X, Y	(a) 2-4 pts along each section / (b) 25-60 n mi > 300 n mi from shore; 10-25 n mi ≤ 300 n mi from shore	→									→		→							
Sampling Intensity Z	IAPBO std levels and m r bottom to 5000 m	→								N/A	→		→		N/A	N/A			N/A	N/A
Sampling Intensity Time	(a) 6 hrs [corresponds to (a) in x,y spacing] / (b) once per month [corresponds to (b) in x,y spacing]										→		→							
Ob synch X, Y	30 min	→								30 min	→		→		30 min	30 min			30 min	30 min
Ob synch Z	30 min	→								N/A	→		→		N/A	N/A			N/A	N/A

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why All requirements listed in 2 above would be met with the exception of
- The fine scale spacing in lines Tentative "system" has initial spacings of ob. at 60 and 100–150 n. mi

Requirements not met and why Bathymetry: Judged better done by other means
Oxygen: Uncertainty about measurement from sur[illegible] for long periods
Rawinsonde: (RH I [illegible] Aradio [illegible] SOA)

REFINED AMO # 24 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen	Bathymetry										
Geo location		Standard Sections →											
Vertical layer		Sfc to 5000 m	Bottom										
Range		0 to 10 ml/l	5 to 10,000 m										
Maximum error		0.03 ml/l	2 m										
Duration of ob		10 min	30 min										
Sampling intensity	X, Y	Same as 1st page	Special locations										
	Z	IAPSO std levels	Bottom										
	Time	Same as 1st page	N/A										
Obs synch	X, Y	30 min	30 min										
	Z	30 min	30 min										

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Rawinsonde (Temperature, wind, R H)											
Geo location		Standard Sections											
Vertical layer		Sfc to 100,000 ft											
Range		SOA											
Maximum error		SOA											
Duration of ob		Std											
Sampling intensity	X, Y	Special locations											
	Z	Std + significant levels											
	Time	12 hrs											
Obs synch	X, Y	SOA											
	Z	SOA											

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

Revised 20 Aug '68

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Parameters / Characteristics		OCEANOGRAPHIC: Curr dir	Curr speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements*: Ht	Per	Dir	METEOROLOGICAL: Air temp	Atmos elect	Atmos press	Dew point	Inso-lation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) / N American Coast out to 400 n mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 1000 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1098 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-2 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 5%
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	600 n mi / 100-150 n mi																			
	Z	20 Std. IAPBO levels (+ sea bottom)						2 levels			Surface										
	Time	6 hrs / 3 hrs																			
Ob synch	X, Y, Z	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 25 REQUIREMENTS U.S. Coast Guard—Ice Patrol Monitoring

Geographic location		Grand Banks – 39°N to 50°N, 42°W to 55°W (SEE MAP)																			
Vertical layer		Sfc to 5000 m	→	→		Sfc to 5000 m	→				Sfc	→		→		Sfc	→				
Range		0 to 360°	0.1 to 6 kts	20 to 40 ‰		-2 to 30°C	0 to 5000 m	0 to 2.0 ly/m			1 to 50 ft	2 to 25 sec	0 to 360°	-15 to 40°C		9[illegible] to 10[illegible] mb	-25 to 40°C	1.1 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 49 kts
Maximum error		10°	0.5 kts or 1% > 5 kts	0.03 ‰		0.1°C	.7 m or 0.5%	1%			1 ft or 5% > 20 ft	10%	10°	0.5°C		1 mb	0.2°C	1%	.01 in./hr	10°	1 kt or 5%
Duration of ob		10 or 30 min	→	→		10 or 30 min	→				10 or 30 min			→		10 or 30 min	→				
Sampling Intensity	X, Y	(a) 7 pts near 44°N, 46°W			(b) 1. 10 n mi in x, 50 n mi in y; 2. 30 n mi in x, 50 n mi in y; 3. 100 n mi in x, 100 n mi in y	→								→			→				
	Z	IAPBO std levels + near bot (near sfc needed)			more intense	→					N/A			→		N/A	→				
	Time	(a) 6 hrs [corresponds to (a) in x,y spacing]			(b) Once every two weeks, Feb. through July [corresponds to (b) in x,y spacing]	→								→			→				
Ob synch	X, Y	10 min	→	→		10 min	→				10 min			→		10 min	→				
	Z	1 min	→	→		1 min	→				N/A			→		N/A	→				

RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above under X, Y spacing category (3) 100 x 100 n. mi would be met out to about 200 n. mi.

Requirements partially met and why: All other requirements listed in 2 above would be met with the exception of

- The time X, Y spacing in categories and 2) plus [illegible] beyond 200 n. mi from shore. Tentative system has initial spacing of 100 to 150 n. mi for CNA and 300 n. mi for IIO.
- The more intensive Z spacing near surface in Ice Patrol areas. Tentative system has showed IAPBO std + near surface.
- The probable 10 min average observation of [illegible] of Labrador and N. Atlantic Currents. System [illegible] 10 min.

Requirements not met and why: Bathymetry. Achieved either now by other means.

REFINED ASK - # 25 REQUIREMENTS (Continued)

GREY AREA PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

REVISED 6 Aug 75

Parameter		Bathymetry											
Geo location		Same as page 1											
Vertical layer		Bottom											
Range		5 to 10,000 m											
Maximum error		2 m											
Duration of ob		10 or 30 mi.											
Sampling intensity	X, Y	30 n mi											
	Z	bottom											
	Time	N/A											
Ob sync	X, Y	30 min											
	Z	30 min											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X, Y												
	Z												
	Time												
Ob sync	X, Y												
	Z												

Remarks

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED MDBS SENSING CAPABILITIES

Revised 20 Aug 68

Parameters / Characteristics		OCEANOGRAPHIC: Curr Air	Curr sport	Salinity	Sound speed	Water temp	Water press depth	Ambient light	Ambient noise	Trans parency	Wave measurements* Ht	Per	Dir	METEOROLOGICAL: Air temp	Dew point	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean 66°N to 66°S / N American Coast out to 400 n mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of navy mast to surface							
Range (5 yr BOM)		0 to 360°	0 to 19 kts	0 to 42 ‰	4500 to 5000 fps	0 to 40°C	0 to 10⁴ psi	0 to 2.5 ly m	50 to 2 db	0 to 70% m	0 to 100 ft	0 to 40 sec	0 to 360°	25 to 40°C	800 to 1000 mb	25 to 40°C	0.01 to 2.0 in hr	0 to in hr	0 to 360°	0 to 160 kts
Max error (5 yr BOM)		5°	0.05 kts or 1%	0.01 ‰	1 fps	0.01°C	3 1%	1%	1 db	2%	0.2 ft or 0%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in hr	2°	0.5 kts or 1%
Duration of ob		Inst or Short period avg (Representative)																			
Sampling intensity	X Y	5 000 n mi / 100-150 n mi																			
	Z	20 Std LA PBC levels (1 near bottom)						2 levels			Surface										
	Time	6 hrs / 1 hrs																			
Ob synch	X Y (Z)	10 min (1 min)																			

*Includes Measurements of Swells

2. REFINED AND/OR REQUIREMENTS (U.S. Coast Guard Search and Rescue)

Geographic location		Ocean Areas Contiguous to the U.S.																			
Vertical layer		Air to 5000 m									Sfc				Sfc					Sfc	Sfc
Range		0 to 360°	3.1 to 6 kts	20 to 40 ‰	4500 to 5000 fps	2 to 30°C	0 to 5000 m				1 to 50 ft	2 to 25 sec	0 to 360°	15 to 40°C	900 to 1000 mb					0 to 360°	0 to 99 kts
Minimum error		0°	0.05 kts or 1%	0.1 ‰	1 fps	0.1°C	3 ft or 0.5%				0.2 ft or 10%	0.1 sec or 1%	1°	0.5°C	1 mb					10°	0.5 kts or 2%
Duration of ob		10 min									10 min				10 min					10 min	10 min
Sampling intensity	X Y	Varies with geographical location of operation									Varies				Varies					Varies	
	Z	LA PBC old levels									N A				N A					N A	N A
	Time	Varies with operation									Varies				Varies					Varies	
Ob synch	X Y	10 min									10 min				10 min					10 min	10 min
	Z	10 min									N A				N A					N A	N A

3. RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above where the variable X Y and Time sampling intensities in the (NA) and (R) are satisfied by those of the tentative "systems"

Requirements partially met and why: All listed requirements would be met with the exception of

- The variable X, Y and Time sampling intensities are time series. Tentative "system" sampling intensities would be too gross in such the (NA and (R) (100-150 n mi and 1 hr 600 n mi and 6 hr)

Requirements not met and why: All near shore requirements within 20 n mi of shore. Tentative "system" does not include near shore stations at this time - restricted to (R) and (NA which begins 25 n mi offshore. Many SAR missions involve small vessels which operate in the near shore region.

SCREENING SHEET FOR RESPONSE DATA REQUIREMENTS

[illegible]

Revised 20 Aug 78

Parameters / Measurement	OCEANOGRAPHIC											METEOROLOGICAL							
	[illegible]	[illegible]	Salinity	Sound speed	Water temp	[illegible]	[illegible]	[illegible]	[illegible]	Ave measurement period HR	DAY	YR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Wind dir	Wind speed
[illegible]	[illegible]																		
[illegible]	Surface to [illegible] depth									Surface		Top of [illegible] must be surface							
[illegible]	[illegible]																		
Max [illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]									Surface									
[illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		
Range	[illegible]																		
Max [illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		
[illegible]	[illegible]																		

[illegible]

[illegible]

[illegible]

REPORTED AMC [illegible]

[illegible]

Parameter													
[illegible]													
Vertical layer													
Range													
Maximum [illegible]													
Duration of [illegible]													
Sampling frequency	[illegible]												
	[illegible]												
	Time												
[illegible]	[illegible]												
	[illegible]												

Remarks

[illegible]

[illegible]

Parameter													
[illegible]													
Vertical layer													
Range													
Maximum [illegible]													
Duration of [illegible]													
Sampling frequency	[illegible]												
	[illegible]												
	Time												
[illegible]	[illegible]												
	[illegible]												

Remarks

[illegible]

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	0 to 12 in./hr	0 to 360°	0 to 100 kts
Max error (5-yr SOA)		5°	0.05 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	3°	0.2°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 5%
Duration of ob.		Inst. or short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)					2 levels				Surface										
	Time	6 hrs/2 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REVISED ASO & NDB REQUIREMENTS U.S. Coast Guard- Oceanographic Services (Ocean Surveys)

Geographic location		Wrn N. Atlantic + Tropical to 20°S, Ern Trop Pacific to 15°S, Trade Wind Zone ar Hawaii, Kuriobio Curr																			
Vertical layer		Sfc to ar Bottom 5000 m max depth									Sfc					Sfc				Sfc	Sfc
Range		0 to 360°	0.1 to 6 kts	29 to 46 ‰	4500 to 5500 fps	-2 to 30°C	0 to 6000 m				1 to 30 ft	2 to 25 sec	0 to 360°	-15 to 40°C		900 to 1060 mb				0 to 360°	3 to 99 kts
Maximum error		10°	.03 kts or 1%	.03 ‰	3 fps	.01°C	0.5 m or 5%				1 ft < 20 3% > 20	0.2 sec	10°	0.5°C		1 mb				10°	1 kt < 20 5% > 20
Duration of ob.		10 min or less									10 min or less					< 10 min				< 10 min	< 1 min
Sampling Intensity	X, Y	Lines w/obs 10—40 n. mi spacing Lines vary 200—500 n. mi apart																			
	Z	IAPSO std lvls									N/A					N/A				N/A	N/A
	Time	6 hrs									6 hrs					6 hrs				6 hrs	6 hrs
Ob. synch.	X, Y	10 min									10 min					10 min				10 min	10 min
	Z	1 min									N/A					N/A				N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The fine (10—40 n. mi) spacing in the Lines: Tentative "system" has an initial spacing of 100—150 n. mi in CNA and 600 n. mi in DO

Requirements not met and why: Bathymetry: Judged better done by other means.
Oxygen, pH, and pictures of fish life: Uncertainty about ob. from buoy unattended for long period.
Chlorophyl, Nutrients, Plankton, and Rawinsonde (RH, T and Wind): Considered beyond 5-yr buoy SOA

Page 1

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 6[illegible]

Parameter		Bathymetry	Oxygen	* pH	TV or cameras * to monitor fish life							
Geo. location		Deep water			Unk							
Vertical layer		Bottom	Sfc to 6000 m	Sfc to 6000 m	Unk							
Range		to 6000 m	0 to 10 ml/l	Unk	Unk							
Maximum error		2 m	0.1 ml/l	Unk	Unk							
Duration of ob.		10 min	→	→	Unk							
Sampling intensity	X, Y	Varies	→	→	Unk							
	Z	Bottom	Std IAPSO levels	Std IAPSO levels	Unk							
	Time	N/A	6 hrs	6 hrs	Unk							
Ob. synch.	X, Y	N/A	10 min	10 min	Unk							
	Z	N/A	1 min	1 min	Unk							

Remarks:

* Accuracies and ranges depend on requirements of potential users.
* Possible future requirements.

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Nutrients	Chlorophyl		* Plankton		Rawinsonde					
Geo location		Deep water	Deep water		Unk		Deep water					
Vertical layer		Sfc to 6000 m	Sfc to 6000 m		Unk		Sfc to 100 k ft					
Range		Unk	Unk		Unk		SOA					
Maximum error		Unk	Unk		Unk		SOA					
Duration of ob.		10 min	10 min		Unk		Std					
Sampling intensity	X, Y	Varies	Varies		Unk		Std					
	Z	Std IAPSO levels	Std IAPSO levels		Unk		Std + significant levels					
	Time	6 hrs	6 hrs		Unk		12 hrs					
Ob. synch.	X, Y	10 min	10 min		Unk		SOA					
	Z	1 min	1 min		Unk		SOA					

Remarks:

* Possible future requirements.

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

Revised 20 Aug '68

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir.	Curr. speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per.	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N American Coast out to 400 n mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1090 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.05 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in/hr	2°	0.5 kts or 1%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling intensity	X, Y	≤ 600 n mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 29 REQUIREMENTS U.S. Coast Guard--Ice Breaking and Polar Oceanography

Geographic location		Arctic and Antarctic Areas																			
Vertical layer		Sfc to 5000 m	→							Sfc to 5000 m	Sfc	→		→		Sfc				Sfc	Sfc
Range		0 to 360°	0.1 to 6 kts	20 to 40 0/00	4500 to 5500 fps	-2 to 30°C	0 to 5000 m	0 to 2.0 ly/m		0 to 70%/m	1 to 50 ft	2 to 25 sec	0 to 360°	-15 to 40°C		900 to 1050 mb				0 to 360°	0 to 99 kts
Maximum error		10°	0.05 kts	0.05 0/00	3 fps	0.01°C	2 ft or 0.5%	1%		2%	1 ft < 20 ft; 5% > 20 ft	10%	10°	0.5°C		1 mb				10°	1 ft < 20 ft; 5% > 20 ft
Duration of ob.		10 min	→							10 min	30 min	→		10 min		10 min				10 min	10 min
Sampling intensity	X, Y	Not stated	→							Not stated	→			→		Not stated				Not stated	
	Z	IAPSO std lvls + nr bottom	→							IAPSO std lvls	N/A	→		→		N/A				N/A	N/A
	Time	6 hrs	→							6 hrs	→			→		6 hrs				6 hrs	6 hrs
Ob. synch	X, Y	30 min	→							30 min	→			→		30 min				30 min	30 min
	Z	30 min	→							30 min	N/A	→		→		N/A				N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why

Requirements not met and why All listed requirements for the Arctic and Antarctic. Tentative data-buoy "system" extends only from 60°N to 60°S

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Bathymetry	Magnetic parameters	Oxygen									
Geo location		Arctic and Antarctic →											
Vertical layer		Bottom	Not stated	Sfc to 5000 m									
Range		5 to 10,000 m	Not stated	0–10 ml/l									
Maximum error		2 m	Not stated	0.03 ml/l									
Duration of ob		10 min	Not stated	10 min									
Sampling intensity	X, Y	Not stated	Not stated	Not stated									
	Z	Bottom	Not stated	Std IAPSO levels									
	Time	N/A	Not stated	6 hrs									
Ob synch	X, Y	N/A	Not stated	30 min									
	Z	N/A	Not stated	30 min									

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		* Sediment	* Bottom cores	* Seismic parameters	* Reviewer add (Temp, wind, R H)								
Geo location		Arctic and Antarctic →											
Vertical layer		Not stated	→	→	Sfc to 100,000 ft								
Range		Not stated	→	→	SOA								
Maximum error		Not stated	→	→	SOA								
Duration of ob.		Not stated	→	→	Nd								
Sampling intensity	X, Y	Not stated	→	→	Not stated								
	Z	Not stated	→	→	Std - significant levels								
	Time	Not stated	→	→	12 hrs								
Ob synch	X, Y	Not stated	→	→	SOA								
	Z	Not stated	→	→	SOA								

Remarks

* Other chemical and biological requirements have not been standardized.

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ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean 60°N to 60°S/N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 50 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 180 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob		Inst. or short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 std. IAPBO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 30—35 REQUIREMENTS ESSA—Total Agency Requirements

Geographic location		Global Deep Ocean/N. American Coast																			
Vertical layer		Sfc to 5000 m	→								Sfc	→		→		Sfc	Sfc		Sfc	→	
Range		0 to 360°	0.05 to 6 kts	28 to 44 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi				1 to 100 ft	1 to 40 sec	0 to 360°	-15 to 50°C		800 to 1099 mb	-25 to 40°C		0 to 12 in./hr	0 to 360°	0 to 180 kts
Maximum error		5°	0.3 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%				1.0 ft or 10%	0.5 sec or 5%	10°	0.5°C		0.5 mb	0.5°C		0.01 in./hr	5°	1 kt or 10%
Duration of ob.		Inst. or short period Avg.	→								Inst or short per. avg	→		→		Inst or short per. avg			6 hr accum	Inst or short per. avg	
Sampling Intensity	X, Y	300 to 600/60 to 150 n. mi	→								300 to 600 n. mi/60 to 150 n. mi	→		→		300 to 600 n. mi/60 to 150 n. mi			60 to 150 n. mi (CNA)	300 to 600/60 to 150 n. mi	
	Z	IAPBO std lvls + nr. bottom	→								N/A	→		→		N/A	N/A		N/A	→	
	Time	6/3 hrs	→								6/3 hrs	→		→		6/3 hrs	6/3 hrs		6/3 hrs	→	
Ob. synch	X, Y	30 min	→								30 min	→		→		30 min	30 min		30 min	→	
	Z	1 min	→								N/A	→		→		N/A	N/A		N/A	→	

3. RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above

Requirements partially met and why

Requirements not met and why: Rawinsonde Data (P, RH, T and Wind) Considered beyond 5-yr buoy SOA

*600 n. mi for initial "system" spacing established by telecon on 6/26/28. (The data from this initial spacing of observations would, through use, help clarify what additional data are actually needed.)

REFINED AMO # 30–35 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X Y												
	Z												
	Time												
Ob synch	X Y												
	Z												

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Upper-Air Soundings Air Temp.	Atmos Press	Dew Point	Wind Dir	Wind Speed							
Geo location		DO/CNA →											
Vertical layer		Sfc to 100 k ft →											
Range		-90 to 50°C	1099 to 10 mb	-60 to 40°C	0 to 360°	0 to 300 kts							
Maximum error		0.5°C	3 mb	0.5°C	10°	[illegible] kts or 10%							
Duration of ob		Inst →											
Sampling intensity	X Y	300 to 600 n. mi	1 ~ 80 n. mi in hurricane areas →										
	Z	~ 300 ft		Cont sequence	1 k ft 2 k ft	[illegible] k ft 1- k ft							
	Time	12 hrs →											
Ob synch	X Y	1 hr →											
	Z	2 hr →											

Remarks

Page

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr. speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N American Coast out to 400 n mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5 yr BOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/in	-80 to -20 db	0 to 70% m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5 yr BOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0 °C	31 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 2%
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n mi/100—150 n mi																			
	Z	30 std. LAPRO levels (+ near bottom)					2 levels				Surface										
	Time	6 hrs/3 hrs																			
Ob synch	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMOS 39A REQUIREMENTS U.S. Dept. Interior (FWPCA) Determine Water Quality

Geographic location		Near shore and Estuaries																			
Vertical layer		Sfc to bottom-1 m	→	→		Sfc to bottom-1 m		Sfc to mid depth	Sfc to mid (depth)					Sfc				Sfc		At 1 m	At 1 m
Range		0° to 360°	0 to 10 kts	0 to 40 0/00		-5 to 35°C		0 to 2.0 ly/m	0 to 70% /m					-3 to 60°C				0.1 to 2.0 ly/m		0 to 36.0°	0 to 54 kts
Maximum error		15°	0.1 kts	5%		0.5°C		5%	10%					1°C				1%		2.0°	1 kt
Duration of ob		5 min	→	→		Inst		1 hr	1 hr					Inst				1 hr		10 min	10 min
Sampling Intensity	X, Y	1—10 n mi	→	→		1—10 n mi		1—10 n mi	1—10 n mi					1-10 n mi				1-10 n mi		1-10 n mi	1-10 n mi
	Z	1 m intervals	→	→		1 m intervals		Sfc, mid-depth	Sfc, mid-depth					N/A				N/A		N/A	N/A
	Time	3 hrs	→	→		3 hrs		3 hrs	3 hrs					3 hrs				3 hrs		3 hrs	3 hrs
Ob synch	X, Y	1 hr	→	→		1 hr		1 hr	1 hr					1 hr				1 hr		1 hr	1 hr
	Z	5 min	→	→		5 min		5 min	5 min					N/A				N/A		N/A	N/A

3 RESULTS OF ASSESSMENT

Requirements fully met.

Requirements partially met and why

Requirements not met and why All listed requirements Tentative "system" does not include near-shore (within 20 n mi) waters at this time—restricted to DOD and CNA which begins 25 n mi offshore

Further investigation of near-shore and estuarine requirements is needed Near-shore measurement capabilities may be different from "system"

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Radiological activity	Oxygen	Turbidity	Elec. Vol. Conductivity		pH						
Geo location		Nearshore and Estuaries →											
Vertical layer		Sfc to bottom – 1 m	→										
Range		5 X background	0–20 mg/l	0–100 JTU	Variable		0–200 mg/l						
Maximum error		10%	0.5 mg/l	10%	10%		5%						
Duration of ob		1 hr	Inst	Inst	Inst		Inst						
Sampling intensity	X, Y	1-10 n mi	→				→						
	Z	1 m interval	→				→						
	Time	3 hrs	→				→						
Ob synch	X, Y	1 hr	→				→						
	Z	5 min	→				→						

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		(1) Chemical (2) Biological (3) Microbiological											
Geo location		Nearshore and Estuaries →											
Vertical layer		Sfc to bottom – 1 m	→										
Range		Variable	→										
Maximum error		± 10%	→										
Duration of ob		Variable	→										
Sampling intensity	X, Y	1-10 n mi	→										
	Z	1 m intervals	→										
	Time	3 hrs	→										
Ob synch	X, Y	1 hr	→										
	Z	10 min	→										

Remarks

1. Chemical: Suspended solids, total solids, biochemical oxygen demand, chemical oxygen demand, and pesticides, organic coliform, [illegible], inorganic cations and anions
2. Biological: Total productivity, algae counts, bottom organisms
3. Microbiological: Total plate counts, coliform counts, fecal streptococci counts

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ASSESSMENT SHEET FOR BERINET DATA REQUIREMENTS

Revised 20 Aug 68

1 TENTATIVELY PROPOSED MODE SENSING CAPABILITIES

Parameters / Characteristics	OCEANOGRAPHIC: Current dir	Current speed	Salinity	Sound speed	Water temp	Water pressure (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	METEOROLOGICAL: Air temp	Atmospheric	Atmospheric pressure	Dew point	Insolation	Precipitation rate	Wind dir	Wind speed
Geographic location	Deep Ocean (60°N to 60°S) / N American Coast or to 400 n mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of temp mast to surface							
Range (5-yr BOA)	0 to 360°	0.05 to 10 kts	0 to 42.5 ppt	4800 to 5000 fps	0 to 40°C	0 to 10⁴ psi	0 to 6 ly m	85 to 20 db	0 to 100%/m	0 to 100 ft	0 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	400 to 1000 mb	25 to 40°C	0.01 to 2.0 ly m		0 to 360°	0 to 140 kts
Max error (5-yr BOA)	5°	0.05 kts or 0.01 %	0.01 %	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%			
Duration of ob	Inst or Short period avg (Representative)																			
Sampling intensity X, Y	< 600 n mi / 100-150 n mi																			
Sampling intensity Z	20 Ref LAPRO levels (near bottom)						2 levels			Surface										
Sampling intensity Time	6 hrs / 3 hrs																			
Ob synch X, Y, Z	10 min, (1 min)																			

*Including measurements of Sonics

1 REFINED ASW/ASW MEASUREMENTS 1. 5 Department of the Interior (FWPCA) Determine Water Quality

Geographic location	Great Lakes															
Vertical layer	Min to bottom 10 m			Min to bottom 12 m	Min to 20 m	Min to 20 m										
Range	0° to 360°	0 kts 8 kts		0 to 36°	0 to 0.5 ly min	0 to 100% m										
Maximum error	15°	25 kts		0.5°	2%	10%										
Duration of ob	10 min			Inst	1 hr	1 hr										
Sampling intensity X, Y	20 n mi			20 n mi	20 n mi	20 n mi										
Sampling intensity Z	20 Ref LAPRO levels 40 km 10 m			6 12, 36 49 m 12.5 m	0 20 m	0 20 m										
Sampling intensity Time	3 hrs			hrs	3 hrs	3 hrs										
Ob synch X, Y	1 hr			1 hr	1 hr	1 hr										
Ob synch Z	10 min			10 min	10 min	10 min										

1 RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why

Requirements not met and why

All listed requirements Tentative "systems" for Ice and U.S. does not include the Great Lakes at this time. The Alaska ice and other arctic problems require further investigation

*Near shore closer to multiple Use Y, Y and Z spacing needs to be finer than listed values

YIREY AREA PARAMETERS [illegible]

Parameter		Radiological activity	Oxygen	[illegible]	[illegible]	[illegible]
Geo location		Great Lakes				
Vertical layer		Water surface [illegible] m				
Range		[illegible] background	[illegible] mg/l	[illegible]	[illegible]	[illegible] mg/l
Maximum error		10%	[illegible] mg/l	10%	[illegible]	[illegible]
Duration of obs		2 yr	Dual	Dual	Dual	Dual
Sampling intensity	X, Y	30 m min				
	Z	0, 15, 30, 45 [illegible]				
	Time	1 yrs				
Obs. speed	X, Y	1 yr				
	Z	10 min				

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR REALITY OF THE ARC FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		(1) Chemical (2) Biological (3) Microbiological														
Geo location		Great Lakes														
Vertical layer		Water surface [illegible] m														
Range		Variable														
Maximum error		10%														
Duration of obs		Variable														
Sampling intensity	X, Y	30 m min														
	Z	0, 15, 30, 45 [illegible]														
	Time	1 hrs														
Obs. speed	X, Y	1 hr														
	Z	10 min														

Remarks

1. Chemical: Dissolved solids, total solids, [illegible] oxygen demand, [illegible]
2. Biological: [illegible] productivity, gas [illegible], [illegible]
3. Microbiological: [illegible]

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED REMOTE SENSING CAPABILITIES

Revised 20 Aug 78

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Surf dir	Surf speed	Salinity	Current speed	Water temp	Wave prop depth	Ambient light	Ambient noise	Trans parency	Wave measurements* Ht	Per	T Dir	Air temp	Atmos elect	Atmos press	Dew point	Visibility	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean 60°N to 60°S, N. American Coast out to 450 n. mi																			
Vertical layer	Surface to 5000 m depth									Surface										
Range (5 yr ROA)	0 to 300°	0.05 to 10 kts; 0.00 kts or 1%	0 to 41 ppt; 0.01 ppt	45.00 to 5400 kps; 1 kps	5 to 40°C; 0.01°C	0 to 10⁴ psi; 0.1%	0 to 1	0 to 1	0 to 20 db	0 to 100% m	0 to 100 ft; 0.2 ft or 1%	0 to 40 sec; 0.1 sec or 1%	0 to 360°							
Max error (5 yr ROA)	*								3 db	2%										
Duration of ob	Inst. or Short period avg (Representative)																			
Sampling Intensity X, Y	< 6 m or 100-150 m grid																			
Sampling Intensity Z	30 (of LA PRC) levels (+ near bottom)						Levels				Surface									
Sampling Intensity Time	Continuous																			
Ob synch X, Y, Z	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AND/OR 67 REQUIREMENTS N(X) (Inshore Surveys - Measure Depth of Water to 400 Fathoms

Geographic location	< 400 Fathoms Depth from 82 Axis 8 America, Africa, Europe, and Australia																	
Vertical layer						Top to bottom												
Range						1 to 750 m												
Maximum error						1 m or 1%												
Duration of ob						Inst												
Sampling Intensity X, Y						Single pts												
Sampling Intensity Z						N/A												
Sampling Intensity Time						Instantaneous												
Ob synch X, Y						N/A												
Ob synch Z						N/A												

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why

Requirements not met and why: Water Depths up to 400 Fathoms [illegible]

REFINED AMO # 67 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Tidal fluctuation											
Geo. location		Same as page 1											
Vertical layer		Sfc											
Range		1 to 20 ft											
Maximum error		1 ft											
Duration of ob		Cont. trace up to 3 mos											
Sampling intensity	X, Y	1 n. mi											
	Z	N/A											
	Time	1 hr											
Ob. synch.	X, Y	10 min											
	Z	N/A											

Remarks:

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo. location													
Vertical layer													
Range													
Maximum error													
Duration of ob.													
Sampling intensity	X, Y												
	Z												
	Time												
Ob. synch.	X, Y												
	Z												

Remarks:

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ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	Air press. (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect.	Atmos press	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 47 0/00	4500 to 5500 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 fy/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 40°C	0 to 10 kv	800 to 1000 mb	-25 to 40°C	0.01 to 2.0 fy/m	0 to 2 in./hr	0 to 360°	0 to 100 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.5 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 1%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100–150 n. mi																			
	Z	20 std. IAFBO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMG # 58 REQUIREMENTS Naval Oceanographic Office – Underwater Environmental Monitoring for Test Ranges

Geographic location		Barking Sands, Kauai; St. Croix; and Autec Test Ranges: San Clemente only Occasional Support																			
Vertical layer		Sfc to bottom	Sfc to bottom		Sfc to bottom	→	→														
Range		0 to 360°	0 to 5 kts		4800 to 5500 fps	-2 to 35°C	0 to 10,000 psi														
Maximum error		10°	0.1 kts or 5%		1 fps	.05°C	3 psi or 5%														
Duration of ob.		Inst or 2 min avg			Inst	→	→														
Sampling Intensity	X, Y	3 buoys 10 n. mi apart, within 20 n. mi of island in each range				→	→														
	Z	Varies deeper near thcl				→	→														
	Time	5 min	5 min		5 min	→	→														
Ob. synch.	X, Y	1 min	1 min		1 min	→	→														
	Z	3 min	3 min		5 min	3 min	3 min														

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met as follows: All requirements in 2 above would be met with the exception of
- 5 min frequency and 1 min X, Y Synch. of ob.: Tentative "system" has much less stringent values.

*All test ranges have maximum depths within the tentative "system" value of 5000 m.

Requirements not met and why: Tidal Fluctuation (DO): Uncertainty about instrumentation meeting required accuracy.
Sediment Deposit: Judged better measured by other means.
The San Clemente Test Range may require intense support occasionally, but none for periods of time.

Page 1

REFINED AMO # 68 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 7 Aug. 68

Parameter		Tidal fluctuation	Sediment deposit										
Geo. location		Test Ranges											
Vertical layer		Sfc	Bottom										
Range		0.5 to 20 ft	N/A										
Maximum error		0.1 ft	0.5 ft										
Duration of ob.		Inst	Inst										
Sampling intensity	X, Y	Same as page 1											
	Z	N/A	N/A										
	Time	30 min	Unk										
Ob. synch.	X, Y	N/A	N/A										
	Z	N/A	N/A										

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo. location													
Vertical layer													
Range													
Maximum error													
Duration of ob.													
Sampling intensity	X, Y												
	Z												
	Time												
Ob. synch.	X, Y												
	Z												

Remarks

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ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per.	Dir.	Air temp.	Atmos. elect	Atmos. press.	Dew point	Insol-ation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°S to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/...	0-12 in./hr	0 to 360°	0 to 150 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.3 ft or 10%	0.1 sec or 1%	5°	0.1°C	01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 200 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	15 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 69 REQUIREMENTS Naval Oceanographic Office World Ocean Survey

Geographic location		Deep Ocean (see Map)																			
Vertical layer		Varies	→	→	→	→	Sfc to bottom		Varies		Sfc	→	→	→			Sfc			Sfc	Sfc
Range		0 to 360°	0 to 5 kts	0 to 40 ‰	4600 to 5600 fps	-2 to 35°C	Sfc to 1100 m		0 to 60 kc		1 to 80 ft	3 to 20 sec	0 to 360°	-25 to 60°			-25 to 60°C			0 to 360°	3 to 120 kts
Maximum error		10°	0.2 kts	0.5 ‰	1 fps	0.1°C	2 m or 1%		3 db		5 ft	2 sec	15°	1°C			1°C			15°	5 kts
Duration of ob.		20 min avg	30 min avg	Inst	→	→	→		10 min		5 min avg	5 min avg	5 min avg	Inst			Inst			Avg period unk	
Sampling Intensity	X, Y	1 vert array		1 site at a time	→	→	→		Unk		1 site at a time	→	→	→			1 site at a time			1 site at a time	
	Z	1000 m	1000 m	Cont	→	→	N. A		Var with season & location		N/A	→	→	→			N/A			N/A	N/A
	Time	3 hrs	3 hrs	Once/site	→	→	N/A		6 hrs		6 hrs	→	→	→			6 hrs			6 hrs	6 hrs
Ob synch	X, Y	10 min	10 min	N/A	→	→	→		N/A		N/A	→	→	→			N/A			N/A	N/A
	Z	3 min	3 min	N/A	→	→	→		N/A		N/A	→	→	→			N/A			N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met: All re[illegible]ments listed in 2 above with the exception of 30 min duration and 3 hr frequency of ob. for current velocity—these could be met with an operational chang[illegible] of [illegible]sed "system."

Requirements partially met and

Requirements not met and why: Gravity, and Magnetic Field Intensity: Uncertainty about measurement from general purpose buoy of type for proposed "system."
Propagation Loss, Bottom Pr[illegible]ties, and Total Cloud Amount: Judged better done by other means.
Bottom Sampling, Biological Sampling, Nutrient Determination and Visibility: Considered beyond 5-yr buoy SOA

GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug. 68

Parameter		Propagation loss		Gravity		Magnetic field intensity		Bottom photos		Total cloud amount			
Geo location		Deep Oceans →											
Vertical layer		Varies		Varies		Varies		Bottom		Sfc			
Range		10 cyc to 10 kc		950 k to 1 m milligal		29 k to 30 k Gamma		N/A		0 to 10/10			
Maximum error		3 db		2 milligal		1 Gamma		N/A		1/10			
Duration of ob		Varies		Inst		Inst		N/A		Inst			
Sampling intensity	X, Y	Unk		Unk		Unk		Varies		Single site			
	Z	Varies		Sea sfc		Sea sfc		N/A		N/A			
	Time	Variable		N/A		1/5 yr		N/A		Unk			
Ob. synch	X, Y	N/A		N/A		N/A		N/A		N/A			
	Z	N/A		N/A		N/A		N/A		N/A			

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Bottom sampling	Biological sampling	Visibility	Nutrient determination							
Geo location		Deep Oceans →										
Vertical layer		Bottom	N/A	Sfc	Not stated							
Range		0.5 to 100 ft core in 6000 m	N/A	0 to >10 mi	Unk							
Maximum error		N/A	N/A	10%	Unk							
Duration of ob		N/A	1–3 hrs	1–3 hrs	Inst							
Sampling intensity	X, Y	Varies	2 site at a time	→	→							
	Z	N/A	2 selected layers		Varies							
	Time	N/A	Once / Site	Once / Site	1/stn/season							
Ob synch	X, Y	N/A	→	→	→							
	Z	N/A	→	→	→							

Remarks

[illegible] SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W. press (depth)	Amoient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos. press	Dew point	Inso-lation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≈ 600 n. mi/100—150 n. mi																			
	Z	20 Std. LAPBO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch	X, Y, (Z)	10 min, (? min)																			

*Includes Measurements of Sea Sa

2. REFINED AMO # 71 REQUIREMENTS Naval Weather Service—Support Airborne Operations

Geographic location		World Wide																		Integrated wind force	
Vertical layer																				Sfc	Sfc
Range																				0 to 360°	0 to 120 kts
Maximum error																				10°	10%
Duration of ob																				10 min	10 min
Sampling Intensity	X, Y																			600 n. mi	600 n. mi
	Z																			N/A	N/A
	Time																			6 hrs	6 hrs
Ob. synch	X, Y																			1 hr	1 hr
	Z																			N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met: Surface requirements for Air Temp., Dew Pt., and Wind—but they are also met by USN AMO # 72.

Requirements partially met and why

Requirements not met and why: Total Cloud Amount. Judged better done by other means.
All other Upper-air Obs. listed on page 2 (above buoy mast to 100K ft). Considered beyond 5-yr buoy SOA.

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 29 Aug. 68

Parameter		Total cloud amount											
Geo location		World-wide											
Vertical layer		0 to 100 k ft											
Range		0 to 100%											
Maximum error		25%											
Duration of ob		Inst											
Sampling intensity	X, Y	600 n mi											
	Z	N/A											
	Time	6 hrs											
Ob synch	X, Y	1 hr											
	Z	N/A											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Cloud base - tops	Visibility A, A-A/G	Refractive index	Vertical motion	Ice crystal part. size	Ozone content	Cosmic radiation	Atmospheric electricity	Rawinsonde (Wind, air temp, D. P.)			
Geo location		World-wide											
Vertical layer		Sfc to 100 k ft	A/A 0-50 k A/G 50-100 k	Sfc to 100 k ft	→	→	40,000 ft to 100,000 ft		Sfc to 100 k ft	Sfc to 100 k ft			
Range		0 to 100 k ft	0 to 20 mi	0 to 500 n units	Unk	→	→	→	→	Std			
Maximum error		20%	15%	1 n unit	Unk	→	→	→	→	Std			
Duration of ob		Inst	Inst	Short per avg	Unk	→	→	→	→	Inst			
Sampling intensity	X, Y	600 n mi	→	→	→	→	→	→	→	→			
	Z	N/A	N/A	1 k ft to 40 k ft 5 k ft > 40 k ft	→	Cont	Cont	Unk	1 k ft to 40 k ft 5 k > 40 k ft	→			
	Time	6 hrs	→	→	→	→	→	→	→	→			
Ob synch	X, Y	1 hr	1 hr	Unk	→	→	→	→	→	1 hr			
	Z	N/A	N/A	Unk	→	→	→	→	→	1 hr			

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	Water press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean 60°S to 60°S / N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in / hr	0 to 360°	0 to 160 kts
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in. hr	2°	0.5 kts or 3%
Duration of ob		Last or Short period avg. (Representative)																			
Sampling Intensity	X, Y	< 100 n mi / 100 – 199 n mi																			
	Z	20 std IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs / 3 hrs																			
Ob swath	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMS 473 REQUIREMENTS Naval Weather Service - Support Water Surface and Subsurface Operations

Geographic location		World Wide																			
Vertical layer		Sfc to bottom max 5000 m	→	→	→	→	→	→	→	→	Sfc	→	→	→	→	→	→	→	→	→	→
Range		0 to 360°	0.5 to 5 kts	25 to 40 0/00	4500 to 5800 fps	-2 to 35°C	0 to 2,000 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	900 to 1050 mb	-25 to 40°C	.015 to 2.0 ly/m	0-8 in/hr	0 to 360°	0 to 160 kts
Maximum error		10°	0.3 kts or 1%	0.1 0/00	1 fps	1°C	1%	1%	3 db	2%	10%	0.1 sec or 1%	10°	0.1°C	.01 kv	1 mb	1°C	2%	0.1 in/hr	5°	10%
Duration of ob		Inst	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	10 min for int. wind	→
Sampling Intensity	X, Y	600 n mi	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
	Z	IAPSO std levels	→	→	→	→	→	→	→	→	N/A	→	→	→	→	→	→	→	→	→	→
	Time	12 hrs	→	→	→	→	→	→	→	→	→	→	→	6 hrs	→	→	→	→	→	→	→
Ob swath	X, Y	10 mir	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
	Z	N. A	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→

3. RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above.

Requirements partially met and why: Sea State: Some measure of sea state can be approximated from wave measurements—whether the coding will be exactly what is wanted must be resolved.

Visibility: Some measure of horizontal surface visibility can be approximated from light back-scatter measurement within close proximity of buoy—whether these will satisfy long-range visibility requirements is a technical question.

Requirements not met and why: Total Cloud Amount: Judged better done by other means.

Tidal Fluctuation (DO): Uncertainty about instrumentation meeting required accuracy.

Cloud Base and Refractive Index: Considered beyond 5-yr buoy SOA.

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 88

Parameter		Total cloud amount	Tidal fluctuation	Sea state *	Horizontal visibility								
Geo location		World wide											
Vertical layer		Above sfc	Sfc	Sfc	Sfc								
Range		0 to 1.0	1 mk	Code 0 to 9	0 to 10 mi								
Maximum error		2.6	10%	1 category	15%								
Duration of ob		Inst	Inst	Inst	Inst								
Sampling intensity	X, Y	600 n mi	600 n mi	600 n mi	600 n mi								
	Z	N/A	N/A	N/A	N/A								
	Time	6 hrs	12 hrs	12 hrs	6 hrs								
Ob synch	X, Y	1 hr	1 hr	1 hr	1 hr								
	Z	N/A	N/A	N/A	N/A								

Remarks *Original sea state measurement is a manual operation which can be approximated by a combination of "system" measurements

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Cloud base	Refractive index										
Geo location		World wide											
Vertical layer		Sfc to 100k ft	Sfc										
Range		0 to 100 k ft	1 mk										
Maximum error		20%	1 mk										
Duration of ob		Inst	Inst										
Sampling intensity	X, Y	600 n mi	600 n mi										
	Z	N/A	N/A										
	Time	6 hrs	6 hrs										
Ob synch	X, Y	1 hr	1 hr										
	Z	N/A	N/A										

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

TENTATIVELY PROPOSED WIDE SENSING CAPABILITIES

Revised 20 Aug '68

Characteristics \ Parameters	Oceanographic: Curr dir	Curr speed	Salinity	Sound speed	Water temp	[illegible]	Ambient light	Ambient noise	Trans parency	Wave measurements*: Ht	Per	Dir	Meteorological: Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean [illegible] to [illegible] American Coast out to 450 n mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (3 yr MOA)	0 to 360°	0 to 10 kts	0 to 42.0 ppt	4500 to 5000 fps	0 to 40°C	0 to 10^4 ppt	0 to 2.0 by m	80 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 by m	0.12 in./hr	0 to 360°	0 to 160 kts
Maximum error (3 yr MOA)	5°	0.03 kts or 1%	0.01 ppt	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 1%
Duration of obs	Inst or Short period avg (Representative)																			
Sampling frequency X Y	~ 600 n mi / 100-150 n mi																			
Sampling frequency Z	30 Std LAYER levels (near bottom)						2 levels			Surface										
Sampling frequency Time	6 hrs / 3 hrs																			
Obs struck X Y (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMOS [illegible] REQUIREMENTS Pacific Missile Range Support Range with Environmental Data

Characteristics \ Parameters	Oceanographic: Curr dir	Curr speed	Salinity	Sound speed	Water temp	[illegible]	Ambient light	Ambient noise	Trans parency	Wave measurements*: Ht	Per	Dir	Meteorological: Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Pt Mugu 32°30' 34°10' 118°20' 122°; Barking Sands 22°00' 22°15' 160°00' 160°50' (26 (15 n mi)																			
Vertical layer	Sfc to [illegible] (max 4572 m)									Sfc					Sfc	Sfc			Sfc	Sfc
Range	0 to 360°	0 to 5 kts	30 to 33 ppt	4500 to 5400 fps	0 to 20°C					0 to 15 ft	0 to 40 sec	0 to 360°	-25 to 60°C		800 to 1099 mb	-25 to 40°C			0 to 360°	0 to 160 kts
Maximum error	5°	0.03 kts or 1%	0.01 ppt	1 fps	0.1°C					0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C		0.1 mb	0.2°C			2°	0.5 kts or 1%
Duration of obs	Inst									30 min			Inst		Inst	Inst			Inst	Inst
Sampling frequency X Y	Varies generally 20 to 50 n mi									Varies ~ 20 to 50 n mi					Varies ~ 20 to 50 n mi				Varies ~ 20 to 50 n mi	
Sampling frequency Z	[illegible]									N A					N A	N A			N A	N A
Sampling frequency Time	[illegible]									3 hrs					3 hrs	3 hrs			3 hrs	3 hrs
Obs struck X Y	9 min									10 min					10 min	10 min			10 min	10 min
Obs struck Z	[illegible]									N A					N A	N A			N A	N A

RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

* The X, Y spacing of 30 to 50 n mi. Tentative "overseas" has an initial spacing of 100-150 n mi in CNA off coast of [illegible] and about 600 n mi off Hawaii

Requirements not met and why: Bathymetry and Total Cloud Amount. Judged better done by other means. Random Sampling. Considered beyond 3 yr bounds of MOA

REFINED AIM 4 73 REQUIREMENTS (Continued)

"NEW AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 6

Parameter		Bathymetry	Total closed transient
Geo location		Point Image	Barking Sands
Vertical layer		Bottom	Air
Range		Unk	2 to 10/10
Maximum error		Unk	1/10
Duration of ob		N/A	Inst
Sampling intervals	X Y	Varies - 20 to 50 n mi	
	Z	N/A	N/A
	Time	6 hrs	6 hrs
Resolution	X Y	10 min	10 min
	Z	N/A	N/A

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Bottom sampling
Geo location		Point Image Barking Sands
Vertical layer		Bottom (max 45/12 m)
Range		Unk
Maximum error		Unk
Duration of ob		N/A
Sampling intervals	X Y	Varies - 20 to 50 n mi
	Z	N/A
	Time	6 hrs
Resolution	X Y	10 min
	Z	N/A

Remarks

Page 2

APPENDIX IV, PART B. ASSESSMENT SHEETS FOR RESEARCH ACTIVITIES

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos. press	Dew point	Insolation	Precip. rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (2 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 5 REQUIREMENTS U.S. Army—Coastal Engineering

Geographic location		N. A. Coast, Hawaii, Great Lakes Where Depth ≤ 125 m																			
Vertical layer		Sfc	Sfc			Sfc					Sfc			→						Sfc	Sfc
Range		0 to 360°	0.05 to 10 kts			-5 to 40°C					1 to 50 ft	1 to 30 sec	0 to 360°	-25 to 60°C						0 to 360°	0 to 150 kts
Maximum error		5°	0.03 kts or 1%			0.01°C					0.2 ft or 5%	0.1 sec or 5%	10°	0.1°C						2°	0.5 kts or 3%
Duration of ob.		≤ 10 min	≤ 10 min			≤ 10 min					10 min	→		≤10 min						10 min	10 min
Sampling Intensity	X, Y	≤ 500 n. mi	≤ 500 n. mi			≤ 500 n. mi					≤ 500 n. mi	→		→						≤ 500 n. mi	≤ 500 n. mi
	Z	N/A	N/A			N/A					N/A	→		→						N/A	N/A
	Time	6 hrs	6 hrs			6 hrs					6 hrs	→		→						6 hrs	6 hrs
Ob. synch	X, Y	5 min	5 min			5 min					5 min	→		→						5 min	5 min
	Z	N/A	N/A			N/A					N/A	→		→						N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of
- The 5-min synch. of ob: Tentative "system" allows 10 min.
- The X, Y spacing of 500 n. mi: Tentative "system" has initial spacing of 600 n. mi.

Requirements not met and why.

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5600 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 1%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/2 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 6 REQUIREMENTS U.S. Army—Lake Survey

Geographic location		Great Lakes																			
Vertical layer		Sfc to bottom	Sfc to bottom			Sfc to bottom					Sfc	Sfc	Sfc	Sfc to 10 m		Sfc to 10 m				Sfc to 10 m	Sfc to 10 m
Range		0 to 360°	0 to 8 kts			-1 to 31°C					0 to 40 ft	2 to 15 sec	0 to 360°	-10 to 40°C		900 to 1099 mb				0 to 360°	0 to 35 kts
Maximum error		20°	0.1 kts			1°C					1.5 ft	0.5 sec	20°	1°C		mb				20°	8 kts
Duration of ob.		1 min	1 min			Inst					5 min	5 min	5 min	Inst		Inst				1 min	1 min
Sampling intensity	X, Y	27.5 n. mi	27.5 n. mi			27.5 n. mi					27.5 n. mi	———	———	———		27.5 n. mi				27.5 n. mi	27.5 n. mi
	Z	1 m	1 m			1 m					N/A	———	———	———		N/A				N/A	N/A
	Time	1 hr	1 hr			1 hr					6 hrs	6 hrs	6 hrs	1 hr		1 hr				1 hr	1 hr
Ob. synch	X, Y	6 min	6 min			6 min					6 min	———	———	———		6 min				6 min	6 min
	Z	6 min	6 min			6 min					6 min	———	———	———		6 min				6 min	6 min

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why

Requirements not met and why All requirements listed: Tentative "system" does not include the Great Lakes. Further investigation of requirements in this area is needed

*These are 1967 data requirements, not refined.

Page 1

REFINED AMO 4 6 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Water level											
Geo. location		Great Lakes											
Vertical layer		Sfc											
Range		-1 to 4 m											
Maximum error		30 mm											
Duration of ob.		Inst											
Sampling intensity	X, Y	31 n. mi											
	Z	N/A											
	Time	1 hr											
Ob. synch.	X, Y	6 min											
	Z	6 min											

Remarks:

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo. location													
Vertical layer													
Range													
Maximum error													
Duration of ob.													
Sampling intensity	X, Y												
	Z												
	Time												
Ob. synch.	X, Y												
	Z												

Remarks:

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound sp	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per.	Dir.	Air temp.	Atmos. elect	Atmos. press.	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) W. Americas Coast out to 400 n. mi.																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.05 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft. or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REVISED AMOS & REQUIREMENTS BCF, Galveston—Research on Water Masses

Geographic location		Gulf of Mexico and Caribbean																			
Vertical layer		Sfc + 500 m	Sfc + 500 m	Sfc to nr. bott.		Sfc to nr. bott				Sfc to 10 m				Sfc		Sfc	→	→		Sfc	Sfc
Range		0 to 360°	0 to 6 kts	20 to 40 0/00		0 to 40°C				0 to 70% m				0 to 45°C		900 to 1089 mb	0 to 45°C	0 to 5.0 ly/m		0 to 360°	0 to 150 kts
Maximum error		10°	0.05 kts or 10%	0.01 0/00		0.01°C				20%				0.1°C		0.2 mb	0.5°C	0.5 ly/m		10°	1 kt or 5%
Duration of ob.		≤ 10 min	→	→		≤ 10 min				≤ 10 min				≤ 10 min		≤ 10 min	→	→		≤ 10 min	≤ 10 min
Sampling Intensity	X, Y	10 n. mi nr. shore 50 n. mi off shore 100 n. mi ob. water	→	→		→				→				→		→		→		→	→
	Z	Sfc + 500 m	Sfc + 500 m	IAPSO + 125, 175 250, 1250 m		IAPSO + 125, 175 250, 1250 m				10 m				N/A		N/A	→	→		N/A	N/A
	Time	6 hrs	→	→		6 hrs				6 hrs				6 hrs		6 hrs	→	→		6 hrs	6 hrs
Ob. synch.	X, Y	30 min	→	→		30 min				30 min				30 min		30 min	→	→		30 min	30 min
	Z	30 min	→	→		30 min				30 min				N/A		N/A	→	→		N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The X, Y spacing of 10 and 50 n. mi (CNA) and 100 n. mi when in DO. The tentative "system" has a spacing of 100—150 n. mi (CNA) and 600 n. mi (DO).
- The range of 0 to 5.0 ly/m for insolation: Tentative "system" has a realistic top value of 2.0 ly/m.
- The 4 additional depths for temperature and salinity: Tentative "system" only covers the 20 IAPSO levels plus the bottom.

Requirements not met and why:

- Total cloud amount: Judged better done by other means
- Oxygen: Uncertainty about ob. from buoy unattended for long periods.

REFINED AMO # 8 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOT IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Total cloud amount	Oxygen										
Geo. location		Gulf of Mexico, Caribbean											
Vertical layer		Sfc	Sfc to nr bot										
Range		0 to 100%	2 to 6 ml/l										
Maximum error		10%	0.5 ml/l										
Duration of ob		≤ 10 min	≤ 10 min										
Sampling intensity	X, Y	10 n. mi near shore 50 n. mi off shore 100 n. mi deep water											
	Z	Sfc	IAPBO + 125, 175, 250, 1200 m										
	Time	6 hrs	6 hrs										
Ob. synch.	X, Y	30 min	30 min										
	Z	N/A	30 min										

Remarks:

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo. location													
Vertical layer													
Range													
Maximum error													
Duration of ob.													
Sampling intensity	X, Y												
	Z												
	Time												
Ob. synch.	X, Y												
	Z												

Remarks:

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ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. **TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES** — Revised 20 Aug '58

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir	Curr. speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per.	Dir	Air temp	Atmos. elect	Atmos. press	Dew point	Inso-lation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) / N American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-90 -20	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1022 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 5%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi / 100--150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs / 2 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. **REFINED AMO # 9A REQUIREMENTS** BCF, Miami – Research on Tuna in Tropical Atlantic, etc.

Geographic location		Tropical Atlantic + Gulf of Mexico 20°N to 20°S (not in Major Currents or Areas of Special Interest)																			
Vertical layer		Sfc to 500 m	→	→		Sfc to 500 m								Sfc				Sfc		Sfc	Sfc
Range		0 to 360°	0.2 to 5 kts	20 to 38 0/00		5 to 35°C								10 to 35°C				0.015 to 2.25 ly/m		0 to 360°	5 to 200 kts
Maximum error		10°	0.1 kt or 20%	0.1 0/00		0.4°C								1°C				1.5%		20°	5 kts or 5%
Duration of ob.		1 min avg.	→	→		1 min avg								1 min avg.				min avg		1 min avg	1 min avg
Sampling Intensity	X, Y	500 n. mi	→	→		500 n. mi								500 n. mi				500 n. mi		500 n. mi	500 n. mi
	Z	Std IAPSO lvls	→	→		Std IAPSO lvls								N/A				N/A		N/A	N/A
	Time	24 hrs	24 hrs	12 hrs		12 hrs								12 hrs				12 hrs		12 hr	12 hrs
Ob. synch	X, Y	10 min	→	→		10 min								10 min				10 min		10 m	10 min
	Z	1 min	→	→		1 min								N/A				N/A		N/A	N/A

3. **RESULTS OF ASSESSMENT**

Requirements fully met:

Requirements partially met and why All requirements listed in 2 above would be met with the exception of

- The wind speed range to 200 kts Tentative "system" has a realistic value of 160 kts
- The insolation range to 2.25 ly/m Tentative "system" has a realistic value of 2.0 ly/m
- The X, Y spacing of 500 n. mi Tentative "system" has an initial spacing of 600 n. mi.

Requirements not met and why

- Oxygen: Uncertainty about ob. from buoy unattended for long periods
- Upper-air Wind: Considered beyond 5-yr buoy SOA.

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen											
Geo. location		Same as page 1											
Vertical layer		Sfc to 500 m											
Range		0.5 to 7 ml/l											
Maximum error		0.1 ml/l											
Duration of ob.		1 min avg											
Sampling intensity	X, Y	500 n. mi											
	Z	IAPSO std levels											
	Time	12 hrs											
Ob. synch.	X, Y	10 min											
	Z	1 min											

Remarks:

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Wind speed	Wind direction										
Geo. location		Same as page 1											
Vertical layer		15 m to top of trade winds											
Range		5 to 200 kts	0 to 360°										
Maximum error		5 kts or 5%	20°										
Duration of ob.		1 min avg.	1 min avg.										
Sampling intensity	X, Y	500 n. mi	500 n. mi										
	Z	Unknown	Unknown										
	Time	12 hrs	12 hrs										
Ob. synch.	X, Y	10 min	10 min										
	Z	1 min	1 min										

Remarks:

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press. (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per.	Dir.	Air temp.	Atmos. elect.	Atmos. press.	Dew point	Inso-lation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec.	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≈ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes measurements of Swells

2 REFINED AMO # 9B REQUIREMENTS BCF, Miami—Research on Tuna in Tropical Atlantic, etc.

Geographic location		Tropical Atlantic (in Areas of Special Interest like Major Current and Lee of Islands) 20°N to 20°S																			
Vertical layer		Sfc to 500 m	→	→		Sfc to 500 m								Sfc						Sfc	Sfc
Range		0 to 360°	0.2 to 6 kts	20 to 36 0/00		5 to 35°C								10 to 35°C						0 to 360°	5 to 200 kts
Maximum error		10°	0.1 kt or 20%	0.1 0/00		0.4°C								1°C						20°	5 kts or 5%
Duration of ob.		1 min avg.	→	→		1 min avg.								1 min avg.						1 min avg.	1 min avg.
Sampling Intensity	X, Y	10—30 n. mi	→	→		10—30 n. mi								10—30 n. mi						10—30 n. mi	10—30 n. mi
	Z	IAPSO levels	→	→		IAPSO levels								N/A						N/A	N/A
	Time	3 hrs	2 hrs	6 hrs		6 hrs								3 hrs						3 hrs	3 hrs
Ob. synch.	X, Y	10 min	→	→		10 min								10 min						10 min	10 min
	Z	1 min	→	→		1 min								N/A						N/A	N/A

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The wind speed range to 200 kts: Tentative "system" has realistic value of 160 kts.
- The X, Y spacing of 10—30 n. mi in DO: Tentative "system" has a spacing of 600 n. mi.
- The 3-hr frequency of ob: Tentative "system" is 6 hr (3 hr could be met by minor operational change).

Requirements not met and why:

- Oxygen: Uncertainty about ob. from buoy unattended for long periods
- Upper-air Wind: Considered beyond 5-yr buoy SOA.

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen											
Geo location		Same as page 1											
Vertical layer		Sfc to 500 m											
Range		0.5 to 7 ml/l											
Maximum error		0.1 ml/l											
Duration of ob		1 min avg.											
Sampling intensity	X, Y	10–30 n. mi											
	Z	Std IAPSO levels											
	Time	6 hrs											
Ob synch	X, Y	10 min											
	Z	1 min											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Wind speed	Wind direction										
Geo location		Same as page 1											
Vertical layer		15 m to top of trade winds											
Range		5 to 200 kts	0 to 360°										
Maximum error		5 kts or 5%	20°										
Duration of ob		1 min avg	1 min avg.										
Sampling intensity	X, Y	10–30 n. mi	10–30 n. mi										
	Z	Unknown	Unknown										
	Time	3 hrs	3 hrs										
Ob synch	X, Y	10 min	10 min										
	Z	1 min	1 min										

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Curr dir	Curr speed	Salinity	Sound speed	Water temp	Water press depth	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Long Cease 60°W to 6[illegible]°W American Coast out to 400 n mi																			
Vertical layer	Surface to 4000 m depth									Surface			Top of buoy mast to surface							
Range (5 yr WOA)	0 to 360°	0.05 to 10 kts	0 to 42.0 ppm	4500 to 5400 fps	5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	8 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	0.12 in./hr	to 360°	0 to 160 kts
Max error (5 yr WOA)	5°	0.03 kts or 1%	0.01 ppm	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 4%
Duration of ob	Inst or Short period avg (Representative)																			
Sampling interval: X, Y	5 000 n mi/100-150 n mi																			
Sampling interval: Z	10 std. IAPSO levels (+ near bottom)					2 levels				Surface										
Sampling interval: Time	6 hrs/3 hrs																			
Ob synch: X, Y (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED ASDO # 14 REQUIREMENTS Bell, Lenhart, M. C. - Research on Menhaden and Blue Crab

Geographic location	Continental Shelf Maine to Texas out to a Maximum Depth of 200 m																			
Vertical layer	Sfc to bottom max 200 m				Sfc to 200 m		Sfc to 200 m		Sfc to 200 m				Sfc						Sfc	Sfc
Range	0 to 360°	0.2 to 4 kts	5 to 40 ppm		2 to 40°C		1 to 2.0 ly/m		0 to 70%/m				25 to 60°C						0 to 360°	0 to 120 kts
Max sum error	20°	0.5 kts and 1% - 3 kts	0.2 ppm		0.3°C		3%		2%				0.1°C						20°	3 kts or 2%
Duration of ob	5-10 min				5-10 min		5-10 min		5-10 min				5-10 min						10 min	10 min
Sampling interval: X, Y	100 n mi				100 n mi		100 n mi		100 n mi				100 n mi						100 n mi	5 mi
Sampling interval: Z	2 lvls				2 lvls		2 lvls		2 lvls				N/A						N/A	N/A
Sampling interval: Time	3 hrs				3 hrs		3 hrs		3 hrs				3 hrs						3 hrs	3 hrs
Ob synch: X, Y	10 min				10 min		10 min		10 min				10 min						10 min	10 min
Ob synch: Z	1 min				1 min		1 min		1 min				N/A						N/A	N/A

3 EXECUTIVE OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above

Requirements partially met and why

Requirements not met and why

- Oxygen: Uncertainty about ob from buoy unstaffed for long periods
- Plankton: Considered Lay and 5 yr buoy [illegible]

SURFACE DATA PARAMETERS [illegible] FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised [illegible]

Parameter		Oxygen											
Geo location		Same as page [illegible]											
Vertical layer		[illegible] to 200 m											
Range		[illegible]											
Maximum error		[illegible]											
Duration of ob		[illegible]											
Sampling accuracy	X, Y	100 m [illegible]											
	Z	[illegible]											
	Time	[illegible]											
Ob cycle	X, Y	[illegible]											
	Z	[illegible]											

Remarks

PARAMETERS CONSIDERED BEYOND THE STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Pressure											
Geo location		Same as page [illegible]											
Vertical layer		[illegible] to 200 m											
Range		[illegible]											
Maximum error		[illegible]											
Duration of ob		[illegible]											
Sampling accuracy	X, Y	100 m [illegible]											
	Z	[illegible]											
	Time	[illegible]											
Ob cycle	X, Y	[illegible]											
	Z	[illegible]											

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NOAA SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Current dir	Current speed	Salinity	Sound speed	Water temp	Wave height (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean 30°N to 60°N, American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5 yr BOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5000 fps	5 to 40°C	0 to 10[4] feet	0 to 2.0 ly/m	50 to 25 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	500 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	0.12 in/hr	0 to 360°	0 to 160 kts
Max error (5 yr BOA)		5°	0.05 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	2°	0.1°C	0.1 kv	1 mb	0.2°C	1%	0.01 in/hr	2°	0.5 kts or 1%
Duration of obs		Inst or Short period avg (Representative)																			
Sampling intensity	X, Y	4 600 n mi/100 - 50 n mi																			
	Z	20 Std (APBO levels + near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Obs synch	X, Y, Z	10 min, (1 min)																			

*variable Measurements of Swells

2. REFINED AND/OR REQUIREMENTS (CF Beaufort N.C.) Research on Menhaden and Blue Crab

Geographic location		Estuaries - Near Shore Areas Cape Cod to Texas																			
Vertical layer		Sfc to bottom				Sfc to bottom		Sfc to bottom						Sfc						Sfc	Sfc
Range		0 to 360°	0.2 to 5 kts	0 to 45 ‰		2 to 40°C		0 to 2.0 ly/m		0 to 70%/m				25 to 40°C						0 to 360°	0 to 120 kts
Maximum error		20°	0.1 kts and 1% - 3 kts	0.2 ‰		0.2°C		1%		2%				0.1°C						20°	5 kts or 20%
Duration of obs		5 - 10 min				5 - 10 min		5 - 10 min		5 - 10 min				5 - 10 min						10 min	10 min
Sampling intensity	X, Y	Will vary with areas of interest. At present limits of spacing are not known																			
	Z	(Same as above)												N/A						N/A	N/A
	Time	3 hrs				3 hrs		3 hrs		3 hrs				3 hrs						3 hrs	3 hrs
Obs synch	X, Y	10 min				10 min		10 min		10 min				10 min						10 min	10 min
	Z	1 min				1 min		1 min		1 min				N/A						N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why

Requirements not met and why — All requirements based upon spacing to needed. Tentative "system" does not include the near shore or estuarine areas. Further investigation of requirements in these areas, e.g.

REFINED AMO # 11 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DAT BUOY SYSTEM

Revised 20 Aug. 68

Parameter		Oxygen												
Geo location		Same as pg. 1												
Vertical layer		Sfc to bottom												
Range		0 to 15 o/oo												
Maximum error		0.4 o/oo												
Duration of ob		≤ 10 min												
Sampling intensity	X, Y	Varies												
	Z	Varies												
	Time	3 hrs												
Ob. synch	X, Y	10 min												
	Z	1 min												

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DAT BUOY SYSTEM

Parameter		Plankton												
Geo location		Same as pg. 1												
Vertical layer		Sfc to bottom												
Range		0 to 1% composition												
Maximum error		5% amount of water with 0.1 mm mesh												
Duration of ob.		Daily for (≤ 10 min) weekly average												
Sampling intensity	X, Y	Varies												
	Z	Varies												
	Time	3 hr												
Ob synch.	X, Y	10 min												
	Z	1 min												

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy coast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	to 60°C	0 to 10 kv	500 to 1060 mb	25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 300 n. mi/100–150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 12 REQUIREMENTS BCF, Seattle—Research on Commercial Fish off NW Coast of North America

Geographic location		Deep Ocean—W. Coast to 160°E, 40°N to Bering Sea/Coastal—42°N—60°N and out to 400 n. mi from the Coast																			
Vertical layer		Sfc to 5000 m	→	→		Sfc to 3000 m	→	→		Sfc to 5000 m	Sfc	→	→					Sfc to -100 m		Sfc	Sfc
Range		0 to 360°	0 to 10 kts	29 to 35 0/00		-2 to 22°C	0 to 9000 psi	0 to 2.0 ly/m		0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°					0.01 to 2.0 ly/m		0 to 360°	0 to 160 kts
Maximum error		5°	0.5 ≤ 5 10% > 5	0.015 0/00		0.02°C	0.5%	1%		2%	0.2 ft or 10%	0.1 sec or 1%	5°					1%		2°	0.5 kts or 3%
Duration of ob.		≤ 10 min	→	→		≤ 10 min	→	→		≤ 10 min	→	→	→					≤ 10 min		≤ 10 min	≤ 10 min
Sampling Intensity	X, Y	60 to 100/5 to 60 n. mi	→	→			→	→			→	→	→					→		→	→
	Z	Std IAPSO lvls	→	→		Std IAPSO lvls	→	→		Std IAPSO lvls	N/A	→	→					N/A		N/A	N/A
	Time	6 hrs/3 hrs	→	→			→	→		6 hrs/3 hrs	→	→	→					6 hrs/3 hrs		6 hrs/3 hrs	6 hrs/3 hrs
Ob. synch	X, Y	10 min	→	→		10 min	→	→		10 min	→	→	→					10 min		10 min	10 min
	Z	1 min	→	→		1 min	→	→		1 min	N/A	→	→					N/A		N/A	N/A

3. RESULTS OF AGREEMENT

Requirements fully met:

Requirements partially met and why: All the requirements listed in 2 above would be met with the exception of

- The fine scale X, Y spacing: Tentative "system" spacing is 600 DO and 100–150 n. mi CNA. There is a special requirement for 5 n. mi spacing on 173°W south of Adak Island—most coastal sections require occasional sampling at 5 n. mi and regular sampling at a maximum spacing of 30 n. mi.

Requirements not met and why:

They feel that the proposed "system" will be too coarse to have any real input to their program.

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter													
Geo. location													
Vertical layer													
Range													
Maximum error													
Duration of ob.													
Sampling intensity	X, Y												
	Z												
	Time												
Ob. synch.	X, Y												
	Z												

Remarks:

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Plankton	Biomnutrients										
Geo. location		Same as pg. 1											
Vertical layer		Sfc to 5000 m	Sfc to 5000 m										
Range		Unk	Unk										
Maximum error		Unk	Unk										
Duration of ob.		Unk	Unk										
Sampling intensity	X, Y	60 to 100/5 to 10 n. mi											
	Z	Std IAPSO levels	Std IAPSO levels										
	Time	6 hrs / 3 hrs	6 hrs / 3 hrs										
Ob. synch	X, Y	10 min	10 min										
	Z	1 min	1 min										

Remarks:

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press. (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per.	Dir.	Air temp	Atmos. elect	Atmos. press	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) / N. Americas Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 40°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.2°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi / 100-150 n. mi																			
	Z	20 Std. IAPBO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs / 3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 13 REQUIREMENTS BCF, Stanford—Air/Sea Interaction Research

Geographic location		Pacific N. of 20°S, W. Coast to ~ 180°. Deep Ocean and Coastal																			
Vertical layer		Sfc to 900 m	Sfc to 900 m	Sfc to 500 m		Sfc to 900 m	Sfc to 900 m	Sfc		Sfc to 500 m				Sfc		Sfc	Sfc	Sfc to unk		Near sfc -5 to 10 m	
Range		0 to 360°	0.05 to 10 kts	0 to 42 0/00		-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m		0 to 70% m				-15 to 40°C		900 to 1060 mb	-25 to 40°C	0.01 to 2.0 ly/m		0 to 360°	0 to 120 kts
Maximum error		5°	0.04 kts or 2%	0.02 0/00		0.02°C	0.1%	1%		2%				0.5°C		0.2 mb	0.2°C	1%		5°	0.5 kts or 3%
Duration of ob.		6 hr avg	6 hr avg	10 min		10 min	10 min	10 min		10 min				1 min or inst		1 min or inst	1 min or inst	10 min		1 min avg	1 min avg
Sampling Intensity	X, Y	100—300 / 60—100 n. mi - 600 n. mi apart				in lines															
	Z	25 lvls flexible		10 lvls		25 lvls		N/A		10 lvls				N/A		N/A	N/A			N/A	N/A
	Time	Cont	Cont	6 hrs		6 hrs	6 hrs	3 hrs		6 hrs				6/3 hrs		6/3 hrs	6/3 hrs	3 hrs		6/3 hrs	6/3 hrs
Ob. synch	X, Y	10 min				10 min	10 min	30 min		10 min				10 min		10 min	10 min	10 min		10 min	10 min
	Z	1 min				1 min	1 min	N/A		1 min				N/A		N/A	N/A	N/A		N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The finer X, Y spacing (all DO and part of CNA): Tentative "system" spacing is 600/100—150 n. mi.
- The finer spacing of 25 levels to 900 m: Tentative "system" has 20 IAPBO levels plus bottom.
- The 6-hr average for current velocity duration of ob: Tentative "system" value is up to 10 min.

Requirements not met and why:

- Total Cloud Amount: Judged better done by other means.
- Oxygen, Tidal Fluctuation, Total Radiation In (if not insolation) Out, and Turbidity (if not transparency): Uncertainty about ob. from buoy unattended for long periods.
- Phytoplankton: Considered beyond the 5-yr buoy SOA.

REFINED AMG # 13 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 27 Aug [illegible]

Parameter		Oxygen	Tidal fluct.	Turbidity	Total rad. in	Total rad. out	Total cloud amount						
Geo. location		Pacific N of 20°S, E of 180° →											
Vertical layer		Sfc to 900 m	Bottom	Sfc to 600 m	Sfc	Sfc	Sfc						
Range		0 to 10 ml/l	0 to 50 m	0 to 80%	Gm-Cal CM^2 min^{-1}	Gm-Cal CM^2 min^{-1}	0 to 10/10						
Maximum error		1 ml/l	01 m	2%	0 to 2.25	0.2 to 2.25	1/10						
Duration of ob		10 min	24 hr avg.	10 min	10 min	10 min	10 min						
Sampling intensity	X, Y	600 n. mi	Selected areas	Selected areas	600 n. mi	→	→						
	Z	10 levels	bottom	10 levels	N/A	N/A	N/A						
	Time	6 hrs	1 hr	6/3 hrs	6/3 hrs	6/3 hrs	6/3 hrs						
Ob. synch	X, Y	10 min	10 min	10 min	30 min	30 min	10 min						
	Z	1 min	N/A	1 min	N/A	N/A	N/A						

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Photo-plankton											
Geo. location		Pacific N of 20°S, E of 180°											
Vertical layer		Sfc to 300 m											
Range		Unk											
Maximum error		Unk											
Duration of ob		Cont.											
Sampling intensity	X, Y	600 n. mi											
	Z	10 levels											
	Time	Cont.											
Ob. synch	X, Y	12 hr											
	Z	12 hr											

Remarks

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos. press	Dew point	Inso-lation	Precip rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N American Coast out to 400 n mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1098 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 ‰	1 fps	0.01°C	±1%	1%	3 db	2%	±2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n mi/100—150 n. mi																			
	Z	20 Std IAPSO levels (near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob synch	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 15 REQUIREMENTS BCF Woods Hole—Research on Major Ground Fish Species off New England Coast

Geographic location		New England Continental Shelf 36°N to 45°N—64°W to 74°W no Deep Water or Gulf Stream																			
Vertical layer		Sfc to 200 m	→			Sfc to 2000 m		Sfc		Sfc to 50 m										Sfc	Sfc
Range		0 to 360°	0 to 10 kts	30 to 35 ‰		-5 to 40°C		0 to 2.0 ly/m		0 to 70%/m										0 to 360°	1 to 150 kts
Maximum error		5°	0.03 kts or 1%	0.01 ‰		±5°C		1%		2%										20°	0.5 kts or 3%
Duration of ob		≤ 10 min	→			≤ 10 min		≤ 10 min		≤ 10 min										≤ 10 min	≤ 10 min
Sampling Intensity	X, Y	30 to 100 n mi	→			30 to 100 n. mi		100 to 300 n. mi		30 to 100 n. mi										100 to 300 n. mi	
	Z	IAPSO std lvls	→			IAPSO std lvls		N/A		IAPSO std lvls										N/A	N/A
	Time	3 hrs	→			3 hrs		3 hrs		3 hrs										3 hrs	3 hrs
Ob synch	X, Y	10 min	→			10 min		10 min		10 min										10 min	10 min
	Z	1 min	→			1 min		N/A		1 min										N/A	N/A

3 RESULTS OF ASSESSMENT

Requirements fully met: All requirements listed in 2 above where X, Y spacing is 100 n. mi or greater

Requirements partially met and why: All listed requirements in 2 above would be met with the exception of

- The X, Y spacing in Marsden squares 115, 116, 150 and 151, if when resolved is less than 100 n. mi. Tentative "system" has spacing of 100 to 150 n. mi in these areas.

Requirements not met and why

- Oxygen: Uncertainty about ob. from buoy unattended for long periods
- Chlorophyll and Phosphates: Considered beyond 5-yr buoy SOA

REFINED AMO # 15 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen											
Geo location		New England Continental Shelf											
Vertical layer		Sfc to 2000 m											
Range		3 to 9 ml/l											
Maximum error		0.1 ml/l											
Duration of ob		Inst											
Sampling intensity	X, Y	30 to 100 n. mi											
	Z	Std IAPSO lvls											
	Time	3 hrs											
Ob. synch	X, Y	10 min											
	Z	1 min											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Chlorophyl	Phosphates										
Geo location		New England Continental Shelf											
Vertical layer		Sfc to 2000 m	→										
Range		0 to 2 mg/cum	0 to 0.5 mga/cum										
Maximum error		0.1 mg/cum	0.1 mga/cum										
Duration of ob		Inst	Inst										
Sampling intensity	X, Y	30 to 100 n. mi											
	Z	Std IAPSO levels	Std IAPSO levels										
	Time	3 hrs	3 hrs										
Ob. synch	X, Y	10 min	10 min										
	Z	1 min	1 min										

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDB SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr. speed	Salinity	Sound speed	Water temp.	W press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp.	Atmos elect	Atmos pres	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S/N American Coast out to 400 n. mi)																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5 yr SOA)		0 to 360°	0 to 10 kts	to	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%	0 to 100 ft	0 to 40 sec	0 to 360°	-25 to 60°C	0 to 15 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 ‰	fps	0.01°C	0.1%	1 ft	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	[illegible]	0.1°C	0.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob		Inst or short period avg. (Representative)																			
Sampling intensity	X, Y	≤ 600 n. mi/100–150 n. mi																			
	Z	20 Std IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob system	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 16 REQUIREMENTS BCF, Booth Bay Harbor, Maine - Research on Herring, Lobster and Sardine Offshore

Geographic location		Gulf of Maine Offshore												(R. H.)							
Vertical layer		Sfc to bottom	→	→		Sfc to bottom		Sfc to bottom		Sfc to bottom	Sfc			Sfc		Sfc	→				
Range		0 to 360°	0 to 5 kts	5 to 35 ‰		-5 to 25°C		0 to 2.0 ly/m		5 to 50%/m	0 to 60 ft			-25 to 40°C		900 to 1060 mb	-15 to 30°C	0.01 to 2.0 ly/m	0 to 12 in./hr	0 to 360°	0 to 80 kts
Maximum error		5°	.03 kts or 1%	0.01 ‰		0.01°C		1%		2%	0.2 ft or 10%			0.1°C		0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst →				Inst		Inst		Inst	Inst			Inst		Inst	→				
Sampling intensity	X, Y	25 to 30 n. mi or at least 3 buoys)*				25 to 30 n. mi		≤ 100 n. mi		25 to 30 n. mi	25 to 30 n. mi			25 to 30 n. mi		25 to 30 n. mi	25 to 30 n. mi	≤ 100 n. mi	25 to 30 n. mi	→	
	Z	Sfc, ≤ 5 m from bottom				Std IAPSO levels		Std IAPSO levels		Std IAPSO levels	N/A			N/A		N/A	→			→	
	Time	≤ 3 hrs	→			≤ 3 hrs		≤ 3 hrs		≤ 3 hrs	≤ 3 hrs			≤ 3 hrs		≤ 3 hrs	→			→	
Ob system	X, Y	10 min	→			10 min		10 min		10 min	10 min			10 min		10 min	→			→	
	Z	1 min	→			1 min		1 min		1 min	N/A			N/A		N/A	→			→	

3 RESULTS OF ASSESSMENT

Requirements fully met: Ambient Light and Insolation

Requirements partially met and why: All other requirements listed above in 2 would be met with the exception of

* Fine X, Y spacing (25 n. mi) Tentative "system" spacing is about 100 n. mi.

*If the buoys were used as an alternative, one off NE Coast of Maine but not in the Bay of Fundy, one just NE of Cape Cod, and one in between then these requirements probably would be met.

Requirements not met and why

- Total Cloud Amount and Tidal Fluctuation Judged better done by other means
- Oxygen Uncertainty [illegible] ob from buoy unattended for long periods
- Cloud Type Considered beyond the 5-yr buoy SOA.

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen	Total cloud amount	Tidal fluctuation	Resultant wind direction speed*	
Geo location		Gulf - Maine Offshore				
Vertical layer		Sfc to bottom	Sfc			
Range		7 to 14 ppm	0 to 10	0 to 30 ft	0 to 360°	0 to 87 kts
Maximum error		0.02 ppm	1.0	0.1 ft	10°	0.5 kts or 3%
Duration of ob		Inst				
Sampling intensity	X Y	25 to 30 n mi at least 3 buoys				
	Z	Std IAPSO levels	N/A			
	Time	3 hrs				
Obs approb	X Y	1 min				
	Z	1 min	N/A			

Remarks *Resultant wind can be computed from wind observations

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Cloud type										
Geo location		Gulf of Maine Offshore										
Vertical layer		Sfc										
Range		N/A										
Maximum error		N/A										
Duration of ob		Inst										
Sampling intensity	X Y	25 to 30 n mi at least 3 buoys										
	Z	Sfc										
	Time	3 hrs										
Obs approb	X Y	10 min										
	Z	N/A										

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITY

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Current dir	Current speed	Salinity	Sound speed	Water temp	Water press depth	Ambient light	Ambient noise	Transmissivity	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 6[illegible]°N American Coast out to 40[illegible] mi)																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr BOA)		0 to 360°	0.05 to 10 kts	0 to 42.0 ‰	4[illegible] to [illegible] fps	0 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	80[illegible] db	0 to 70% /m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr BOA)		5°	0.33 kts or [illegible]	[illegible]	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob		Inst or Short period avg (Representative)																			
Sampling Intensity	X, Y	< 600 m/100-150 m/mi																			
	Z	20 std LAPBO levels (+ near [illegible])						2 levels			Surface										
	Time	4 hrs/3 hrs																			
Ob synch	X, Y, (Z)	10 min, (1 min)																			

*Includes measurements of Swells

2 REFINED AMOF 17 REQUIREMENTS BCF, Booth Bay Harbor, Maine - Research on Fish Near Shore

Geographic location		Gulf of Maine (Coastline, Within 10 n mi)																			
Vertical layer		Sfc to bottom				Sfc to bottom		Sfc to bottom		Sfc to bottom	Sfc			Sfc		Sfc					
Range		0 to 360°	0 to 5 kts	5 to 35 ‰		5 to 25°C		0 to 2.0 ly/m		5 to 50% /m	0 to 60 ft			-25 to 40°C		900 to 1066 mb	15 to 30°C	0.01 to 2.0 ly/m	0 to 12 in./hr	0 to 360°	0 to 87 kts
Maximum error		5°	0.3 kts or 1%	0.01 ‰		0.01°C		1%		2%	0.2 ft or 10%			0.1°C		0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob		Inst				Inst		Inst		Inst	Inst			Inst		Inst					
Sampling Intensity	X, Y	8 to 13 n mi				8 to 13 n mi		8 to 13 n mi		8 to 13 n mi	8 to 13 n mi			8 to 13 n mi		8 to 13 n mi					
	Z	Closer at sfc 9std LAPBO levels									N/A			N/A		N/A					
	Time	3 hrs				3 hrs		3 hrs		3 hrs	3 hrs			3 hrs		3 hrs					
Ob synch	X, Y	10 min				10 min		10 min		10 min	10 min			10 min		10 min					
	Z	1 min				1 min		1 min		1 min	N/A			N/A		N/A					

3 RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why

Requirements not met and why All requirements listed Tentative "system" does not include the near shore or estuarine areas Further investigation of requirements in these areas is needed

REFINED AMC [illegible] REQUIREMENTS (continued)

GREY AREA: PARAMETERS NOT INCLUDED IN THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug [illegible]

Parameter		Oxygen	Visual amount	Visual turbulence	Resultant wind* direction	Resultant wind* speed
Geolocation		Gulf of Mexico [illegible]				
Vertical layer		Surface [illegible]	Surf			
Range		[illegible] ppm	[illegible]	[illegible] to [illegible] ft	[illegible]	[illegible] to [illegible] kts
Maximum error		[illegible] ppm	[illegible]	[illegible]	[illegible]	[illegible] kts or [illegible]
Duration of ob		Inst				
Sampling intensity	X, Y	[illegible] to [illegible] mi				
	Z	Closer near effective levels	N/A			
	Time	[illegible] hrs				
Ob. speed	X, Y	[illegible] mph				
	Z	[illegible] mph	N/A			

Remarks: * Best source for this, Buoys would be present in additional land based stations
* Resultant wind can be computed from wind observations

PARAMETERS NOT INCLUDED BEYOND THE 5-YR STAGE: NONE ARE FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Cloud type
Geolocation		Gulf of Mexico [illegible]
Vertical layer		Surf
Range		N/A
Maximum error		N/A
Duration of ob		Inst
Sampling intensity	X, Y	[illegible] mi
	Z	N/A
	Time	[illegible] hrs
Ob. speed	X, Y	[illegible] mph
	Z	N/A

Remarks

ASSESSMENT SHEET FOR PERISHABLE DATA REQUIREMENTS

1. TENTATIVELY PROPOSED REQUIREMENT CHARACTERISTICS

Revised 20 Aug '69

Parameters / Characteristics	Meteorological: Air temp	Dew point	Humidity	Wind speed	Water temp	Air temp	Current speed	Current dir	Tide height	Average measurement period: Hr	Day	Mnth	Meteorological: Air temp	Atmos press	Visibility	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep ocean [illegible]																			
Vertical layer	Surface [illegible]									Surface										
Range	[illegible]												Top of buoy mast to surface							
Measurement accuracy	[illegible]																			
Duration of obs	Instr or Observer [illegible] Representative																			
Remaining intensity	[illegible]																			
	[illegible]						2 levels			Surface										
Time	6 hrs [illegible]																			
Observer	[illegible]																			

The table: Measure sense of [illegible]

2. REFINED AMPLE OF REQUIREMENTS [illegible] Oceanographic Research

Geographic location	[illegible] Cape Hatteras																	
Vertical layer	Bottom [illegible]			Bottom														
Range	[illegible]			[illegible]														
Measurement accuracy	[illegible]			[illegible]														
Duration of obs	[illegible]			[illegible]														
Remaining intensity	[illegible]			[illegible]														
Time	[illegible]			[illegible]														
Observer	[illegible]			[illegible]														

[illegible] ASSESSMENT

Requirements [illegible]

Requirements met [illegible] [illegible]

Requirements not met and why

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Characteristics \ Parameters		OCEANOGRAPHIC												METEOROLOGICAL						
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Rel hum	Precip rate	Air [illegible]	[illegible]
Geographic location		Deep Ocean (60°N to 60°S) / American Coast out to 400 n. mi																		
Vertical layer		Surface to 5000 m depth									Surface			Top 2 [illegible]						
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-2 to 40°C	0 to 10^4 psi	[illegible] m	[illegible] dB	[illegible] m	0 to 30 ft	1 to 30 sec	0 to 360°	[illegible]	[illegible]	400 to 1000 mb	[illegible]	[illegible]	[illegible]	[illegible]
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 ‰	1 fps	0.5°C	1%	[illegible]	[illegible] dB	2%	0.2 ft or 10%	[illegible] or 1%	1°	0.1°C	1 mb	0.1 mb	1%	[illegible]	[illegible]	[illegible]
Duration of ob		Inst or Short period avg (Representative)																		
Sampling intensity	X, Y	≤ 600 n. mi / 100–150 n. mi																		
	Z	20 Std. IAPSO levels (+ near bottom)						2 [illegible]			Surface									
	Time	6 hrs / 3 hrs																		
Ob synch	X, Y, Z	10 min, 1 min																		

*Includes Measurements of Swells

2 REFINED AMO # 20 REQUIREMENTS BSFL, Sandy Hook Marine Laboratory - Fish Distribution Along E. Coast of U.S.

Geographic location		U.S. East Coast—Cape Cod to Florida Keys out to a Depth of 70 Fathoms																		
Vertical layer		Sfc - bottom	Sfc - bottom	Sfc to bottom		Sfc to bottom														
Range		0 to 360°	0 to 4 kts	25 to 36 ‰		2 to 30°C														
Maximum error		10°	.03 kts or 1%	0.1 ‰		0.5°C														
Duration of ob		≤ 10 min	→	→		10 min														
Sampling intensity	X, Y	Transect lines - 100 n. mi apart Spacing in lines - 1, 2, 5, 10, 20, 30, 40, 50 n. mi from coastline																		
	Z	N. A.	N/A	Std IAPSO levels		5 m to 30 m then IAPSO levels														
	Time	3 hrs	→	→		3 hrs														
Ob synch	X, Y	10 min	→	→		10 min														
	Z	1 min	→	→		1 min														

3 RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why All requirements listed in 2 above with the exception of

- The fine spacing of 10 n. mi in transect. Tentative "system" spacing is about 100 n. mi
- The Z spacing in the first 30 m for water temperature at least between Cape Cod and Hatteras. Tentative "system" spacing more gross

Requirements not met and why All near-shore requirements within 20 n. mi of shore. Tentative "system" locations start about 25 n. mi off the coast

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmospheric	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S, N. American coast out to 400 n. mi)																			
Vertical layer		surface to 5000 m. depth									Surface			Top of boom mast to surface							
Range (5-yr SOA)		0 to 360°	0.06 to 10 kts	0 to 42 0/00	4500 to 5800 fps	5 to 30°C	0 to 10^4 psi	0 to 2.0 lx m	80 to 20 db	0 to 70%/m	0 to 100 ft	1 to 60 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 60°C	[illegible]	[illegible] hr	0 to 360°	[illegible]
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	[illegible] fps	0.1°C	1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.1°C	1%	[illegible] hr	5°	[illegible]
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMG # 21 REQUIREMENTS BSF Tiburon Marine Laboratory—Fish Distribution Along West Coast

Geographic location		Continental Shelf of Western U.S. (P[illegible])																			
Vertical layer		Sfc to bottom	Sfc to bottom	Sfc to bottom		Sfc to bottom				Sfc to bottom											
Range		0 to 360°	0 to 6 kts	30 to 35 0/00		[illegible] to 35°C				Unk											
Maximum error		5°	0.1 kts	0.5 0/00		0.25°C				Unk											
Duration of ob		Inst	→	→		Inst				Inst											
Sampling intensity	X, Y	Varies 10 to 45 n. mi	→	→	→	→	→	→	→	→											
	Z	0, 10, 30, 50 + 100 m	→	→	→	→	→	→	→	→											
	Time	1 hr	→	→		[illegible]r				1 hr											
Ob synch	X, Y	5 min	→	→		[illegible] min				5 min											
	Z	1 min	→	→		[illegible] min				1 min											

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The X, Y spacing of 10 to 45 n. mi. Tentative "system" has initial spacing of 100 to 150 n. mi in CNA.
- The time sampling intensity of 1 hr. Tentative "system" has ob. every 3 hrs.
- The 5 min X, Y synch. of ob. Tentative "system" is was 10 min.

Requirements not met and why

*These are 1967 data requirements, not refined

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised [illegible]

Parameters / Characteristics		OCEANOGRAPHIC: Curr dir	Curr speed	Salinity	Sound speed	Water temp	Ambient press (depth)	Ambient light	Ambient noise	Trans darkness	Wave measurements*: Ht	Pe	Dir	METEOROLOGICAL: Air temp	Atmos press	Atmos press	Dew point	Ins [illegible]	Precip rate	Wind [illegible]	[illegible]
Geographic location		Deep Ocean (60°N to 60°S) N American Coast out to 4[illegible] mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5 yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 [illegible]	4500 to 5400 fps	[illegible]	[illegible]	0 to 2.5 km	40 to 20 dB	0 to 70% /m	0 to 100 ft	1 to 40 sec	0 to 360°	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max error (5 yr SOA)		5°	0.05 kts or 1%	0.01 [illegible]	1 fps	[illegible]	[illegible]	[illegible]	[illegible]	2%	0.2 ft or [illegible]	[illegible] sec or 1%	5°	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Duration of ob		Inst or Short period avg (Representative)																			
Sampling Intensity	X, Y	≤ 600 n mi / 60–150 n mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs / 3 hrs																			
Ob. synch.	X, Y (Z)	10 min, (1 min)																			

*Includes measurements of Swells

2 REFINED AMO # [illegible] REQUIREMENTS U.S. Coast Guard—Ice Patrol Research

Geographic location		Grand Banks, Labrador Sea, Baffin Bay, Hudson Straits																			
Vertical layer		Sfc to 5000 m									Sfc										
Range		0 to 360°	0 to 6 kts	20 to 40 [illegible]	4500 to 5500 fps	[illegible]	[illegible]	0 to 2.0 km			1 to 50 ft	2 to 2[illegible] sec	0 to 360	[illegible] to 10 Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maximum error		10°	0.5 kts or 1%	0.5 [illegible]	5 fps	0.1	2 ft or 5%	1%			1 ft or 5%	10%	10	0.1°C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Duration of ob		≤ 10 min or 30 min avg ≤ 10 min									10 min										
Sampling Intensity	X, Y	30 to 100 n mi									30 to 100 n mi										
	Z	IAPSO Std Lev									N/A										
	Time	6 hrs									6 hrs										
Ob. synch	X, Y	20 min									10 min										
	Z	1 min									N/A										

3 RESULTS OF ASSESSMENT

Requirements fully met: Some requirements listed in 2 above—except for the current in the mixing zone of the Labrador and North Atlantic currents where [illegible] required—could be met by operational change.

Requirements partially met and why:

Requirements not met and why: All requirements in the Hudson Straits and Baffin Bay (Tentative "System" does not include these areas)

- Bathymetry: Judged better done by other means
- Bottom Curve: Considered beyond 5-yr buoy SOA.

REFINED AMO # 26 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Bathymetry											
Geo location		Same as pg. 1											
Vertical layer		Bottom											
Range		5 to 10,000 m											
Maximum error		2 m											
Duration of ob		5-10 min											
Sampling intensity	X, Y	30 to 100 n. mi											
	Z	N/A											
	Time	N/A											
Ob synch	X, Y	N/A											
	Z	N/A											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Bottom sampling											
Geo location		Same as pg. 1											
Vertical layer		Bottom											
Range		N/A											
Maximum error		N/A											
Duration of ob		N/A											
Sampling intensity	X, Y	30 to 100 n. mi											
	Z	N/A											
	Time	N/A											
Ob synch	X, Y	N/A											
	Z	N/A											

Remarks

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug 88

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir.	Curr speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Sig	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 80°S/N American Coast out to 400 n mi)																			
Vertical layer		Surface to >300 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.1 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 lx m	80 to 20 db	0 to 70% /m	0 to 100 ft	1 to 60 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 45°C	0.01 to 2.0 ly	0 to 12 in. hr	0 to 360°	0 to 160 kts
Max error (5 yr SOA)		5°	0.3 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	1 kv	0.1 mb	0.2°C	1%	0.5 in. hr	2°	0 kts or 5%
Duration of ob		Inst. or short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100–150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)					2 levels				Surface										
	Time	6 hrs/3 hrs																			
Ob. synch	X, Y, (Z)	10 min, (1 min)																			

*Includes measurements of Swells

2. REFINED AMO 031-37 REQUIREMENTS ESSA-Total Agency Requirements

Geographic location		Global Deep Ocean/N American Coast																			
Vertical layer		Sfc to 5000 m	→	→		Sfc to 5000 m															
Range		0 to 360°	0.5 to 6 kts	28 to 48 0/00		-5 to 40°C															
Maximum error		5°	0.3 kts or 1%	0.01 0/00		0.1°C															
Duration of ob		Near sfc	→	→		Near sfc															
Sampling Intensity	X, Y	300 to 400 n. mi/60 to 150 n. mi				300 to 600 n. mi/60 to 150 n. mi															
	Z	IAPSO Std lvls & nr bot	→			IAPSO Std lvls & nr bot															
	Time	* 6 min.	→	→		* 6 min															
Ob synch	X, Y	N/R	→	→		N/R															
	Z	5 min	→	→		5 min															

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The 6 min frequency of ob. Tentative system values are 6/3 hrs

* The required ob. period is for 30 days for correlation with tide sta. This 1 time requirement need not be synchronized with other locations and might be fulfilled by [illegible] to 6 min in selected buoys for 30 day periods

Requirements not met and why

- Tidal fluctuation. Uncertainty about ob. from buoys unattended for long periods

REFINED AD [illegible] 31–37 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		"Tidal Inclination"*											
Geo location		Deep Ocean/North American Coast											
Vertical layer		Bottom as reference											
Range		0 to 10 ft											
Maximum error		0.1 ft											
Duration of ob		Near inst											
Sampling intensity	X, Y	300 to 600 / 60 to 150 ft. [illegible]											
	Z	N/A											
	Time	5 min											
Ob synch	X, Y	N/R											
		N/A											

Remarks: *Not [illegible] mensuration of data is required. Data o[illegible] [illegible] stored [illegible] the gauge or in the buoy and retrieved during regular buoy servicing visits

PARAMETERS CONSIDERED BEYOND THE 5-YEAR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X, Y												
	Z												
	Time												
Ob synch	X, Y												
	Z												

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED MDBS SENSING CAPABILITIES

Revised 20 Aug 68

Parameters / Characteristics	OCEANOGRAPHIC: Curr dir	Curr speed	Salinity	Sound speed	Water temp	Water press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements*: Ht	Per	Dir	METEOROLOGICAL: Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean 40°N to 40°N Aleutians Coast out to 450 n mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range 5 yr BOA	0 to 360°	0.36 to 10 kts	0 to 42.9 m/sec	4896 to 5000 fps	5 to [illegible]	0 to 10⁴ psi	0 to 2 fy m	0 to 20 db	0 to 20% m	0 to 100 ft	1 to 40 sec	0 to 360°	15 to 40°C	0 to 10 kv	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max error 5 yr BOA	5°	0.01 kts or 1%	0.01 0.30	1 fps	0.1°C	0.1%	1%	3 db	2%	2 ft or 10%	[illegible] or 1%	1°	0.1°C	0.1 kv	0.1 mb	[illegible]	1%	[illegible]	[illegible]	[illegible]
Duration of ob	Short or Short period avg (Representative)																			
Sampling intensity: X Y	≤ 600 n mi/100–150 n mi																			
Sampling intensity: Z	36 std LAPBO levels (+ near bottom)					2 levels				Surface										
Sampling intensity: Time	6 hrs/3 hrs																			
Ob events: X Y (Z)	10 min (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 60 REQUIREMENTS NFK PMR Research on Effect of Pollutants on Shell Fish

Geographic location	Coastal & Estuaries & 2 buoys to areas 40°30'N-40°15'N and 74°40'W-73°55'W & 39°30'N-39°N and 74°30'W-75°W																		
Vertical layer	Surf to 200 m				Surf 20 m				Surf to 200 m	Surf				Surf					
Range	0 to 360°	0.05 to 10 kts	0 to 42.9 m/sec		5 to 65°F	0 to 10⁴ psi	0 to 2.0 fy m		0 to 20% m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 85°F	100 to 1099 mb	40°F	0.1 to 2.0% m	0 to 10		
Maximum error	5°	0.01 kts or 1%	0.01 m/sec		0.1	0.1%	1%		2%	0.2 ft or 10%	0 sec or 1%	5°	0.1°C	0.1 mb	0.1°F	[illegible]	[illegible]		
Duration of ob	≤ 10 min				≤ 10 min				≤ 10 min					10 min					
Sampling intensity: X Y	25 to 50 n mi ≤ 50 n mi of the coast; ≤ 100 n mi elsewhere																		
Sampling intensity: Z	LAPBO Std levels				LAPBO Std levels	2 levels			2 levels	N/A				N/A					
Sampling intensity: Time	3 hrs				3 hrs				3 hrs					3 hrs					
Ob events: X Y	10 min				10 min				10 min					10 min					
Ob events: Z	1 min				1 min				1 min	N/A				N/A					

1 REVIEW OF AMO REQUIREMENT

Requirements fully met

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of
- The time X Y spacing of 25 to 50 n mi out to 50 n mi off the coast. Tentative system spacing is about 100 n mi

Requirements not met and why
- [illegible] requirements in near-shore waters (outside 20 n mi of shore). Tentative system spacing about 2.0 n mi out
- All grey area "parameters" listed on top of 2nd page. Either judged better done by other means or there is uncertainty about ob from buoys or [illegible] for long periods
- All parameters listed at the bottom of 2nd page. Considered beyond 5-yr buoy BOA

REFINED AREA # 40 REQUIREMENTS (Continued)

SURVEY AREA PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Total cloud amount	Bathymetry	Tidal fluctuation	Bottom photography	Propagation loss	Sediment deposit	Turbidity	pH	Radiological chemistry	Oxygen	Carbon dioxide	Biological growth
Geo location		Coastal Areas and Estuaries											
Vertical layer		Sfc	Bottom	Bottom	Bottom	Sfc	Bottom	Sfc to 100 m		Bottom			Bottom
Range		0 to 100%	Not stated	Not stated					1 to 14	Not stated	0 to 10 ml	0 to 60	Not stated
Maximum error		5%	5%	Not stated	Not stated	10%	Not stated	10%	1%	2%	1	1	Not stated
Duration of ob		< 10 min											
Sampling intensity	X Y	10 to 40 m and 1-50 m of the coast; < 100 m, mid elsewhere											
	Z	N/A	N/A	N/A	N/A	N/A	N/A	2 levels	1 at 1 m and levels				N/A
	Time	6 or 3 hrs											
Ob. area	X Y	10 m/s											
	Z	N/A						1 min					

Remarks Same areas where shellfish stations are connected principally in New York or Delaware Bay

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM Toxic or Trace Metals

Parameter		Beryllium	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc	Cobalt	Manganese	Iron
Geo location		Same as above										
Vertical layer		0-100 m										
Range		6×10^{-7} to 4×10^{-6}	0.00011 to 0.011	0.00008 to 0.0005	0.005 to 0.30	0.00003 to 0.0003	0.054 to 0.050	0.00018 to 0.0030	0.11 to 1.00	0.00027 to 0.025	0.02 to 2.0	0.1 to 1.0
Maximum error		1% to 1% or 3%										
Duration of ob		< 10 m s										
Sampling intensity	X Y	< 100 m										
	Z	3 levels										
	Time	6 or 3 hrs										
Ob area	X Y	10 m/s										
	Z	1 min										

Remarks Biomedical implications were performed. The above metals are of significant importance

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED MINE SEARCH CAPABILITY

Parameters / Characteristics	Current dir	Current speed	Salinity	Sound speed	Sea temp	Ambient noise	Ambient noise	Transmission loss	Ave measurements HI	Per	IKr	Acoustic signal	Acoustic signal	Acoustic noise	Data rate	Data latency	Acoustic noise	Acoustic noise	Acoustic noise
Geographic location	Deep Ocean [illegible]																		
Vertical layer	Surface to 5000 m depth								Surface										
Range (km)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max error (% or db)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Duration of obs	Instr or short overload avg [illegible]																		
Sampling rate (X, Y)	[illegible]																		
Sampling rate (Z)	[illegible]								1 meter										
Sampling rate (Time)	[illegible]								Surface										
Obs events (X, Y, TO)	[illegible]																		
Obs events (Z)	[illegible]																		

* Use other measurements of results

2. REFINED AMOS 44 REQUIREMENTS NEF Dulse Marine Lab Dendroic [illegible] USA Gravity [illegible] Small stream structure

Geographic location	[illegible]																		
Vertical layer	[illegible]					[illegible]													
Range	[illegible]					[illegible]													
Maximum error	[illegible]					[illegible]													
Duration of obs	[illegible]					[illegible]													
Sampling rate (X, Y)	[illegible]																		
Sampling rate (Z)	[illegible]																		
Sampling rate (Time)	[illegible]					[illegible]													
Obs events (X, Y)	[illegible]					[illegible]													
Obs events (Z)	[illegible]					[illegible]													

REQUIREMENT ASSESSMENT

Measurements fully met

Measurements partially met and why: [illegible]

- [illegible]
- [illegible]

Measurements not met and why

- [illegible]
- [illegible]
- [illegible]

GREY AREA PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Oxygen	Tidal fluct
Geo location		Onslow Bay	
Vertical		Sfc to 200 m	Bottom
Range		3 to 7 ml/l	Not stated
Maximum error		3%	Not stated
Duration of ob		1 min	3 min
Sampling intensity	X, Y	Same as page 1	
	Z	10 m < 50 IAPSO 50 m	Bottom
	Time	12 hrs	12 hrs
Ob. synch	X, Y	10 min	10 min
	Z	10 min	N/A

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY (B) ITEM

Parameter		Silicate	Phosphate	Nitrate
Geo location		Onslow Bay		
Vertical layer		Sfc to 200 m	———	———
Range		0 to 40 mgs/l	———	———
Maximum error		5%	———	———
Duration of ob		1 min	———	———
Sampling intensity	X, Y	Same as page 1		———
	Z	10 m < 50 m IAPSO levels > 50 m		———
	Time	12 hrs	———	———
Ob. synch	X, Y	10 min	———	———
	Z	10 min	———	———

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 29 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Trans. parency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of heavy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5400 fps	-5 to 40°C	0 to 10^4 psi	0 to 2 0 ly/m	-86 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1050 mb	-25 to 40°C	0 to 2 0 ly/m	[illegible]	0 to 360°	0 to 140 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0 1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	01 kv	0.1 mb	0.2°C	1%	[illegible]	5°	0.5 kts or 5%
Duration of ob.		Inst. or Short period avg (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100– 150 n. mi																			
	Z	20 Std. IAPBC levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMC #47 REQUIREMENTS NSF, U. of Miami-Research on Oceanographic Env. Par. & Underwater Acoustical Propagation

Geographic location		Florida straits off Bimini, Bahamas and Miami																			
Vertical layer		Sfc to bottom max 800 m			Sfc to bottom						Sfc		Sfc							Sfc	Sfc
Range		0 to 360°	25 to kts		4° to 33°C						0.5 to 50 ft		0 to 360°							0 to 360°	2 to [illegible]
Maximum error		10°	0.25 kts		0.5°C						0.5 ft		30°							[illegible]	1 kts
Duration of ob.		10 sec avg			Inst						1 min avg. of 5 sec readings									10 sec avg	
Sampling Intensity	X, Y	Special points about 3 and 7 n. mi from sound source																			
	Z	25, 50, 100 150, 200 & ea. 150 m to bottom									N/A		N/A							N/A	N/A
	Time	Unk	Unk		Unk						Unk		Unk							Unk	Unk
Ob. synch	X, Y	5 min	5 min		5 min						5 min		5 min							5 min	5 min
	Z	1 min	1 min		1 min						N/A		N/A							N/A	N/A

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The spacing of 3 and 7 n. mi (CNA). Tentative "system" spacing is about 100 n. mi.
- The 5 min synch. of ob.: Tentative "system" allows up to 10 min
- The unknown frequency of ob. when less than 3 hrs: Tentative "system" frequency is 3 hrs.

Requirements not met and why

- All requirements in near-shore waters (within 20 n. mi of shore). Tentative "system" starts about 25 n. mi out.
- Tidal fluctuation: judged better done by other means in this case since uncertainty about ob. from buoy unattended for long periods

REFINED AMO # 47 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 30 Aug 91

Parameter		Tidal fluct.											
Geo location		Florida Straits											
Vertical layer		Sfc to bottom max 600 m											
Range		0.1 to 3 ft											
Maximum error		0.2 ft											
Duration of ob		Inst.											
Sampling intensity	X, Y	Spec. points											
	Z	N/A											
	Time	Unk											
Ob. synch	X, Y	5 min											
	Z	N/A											

Remarks:

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X, Y												
	Z												
	Time												
Ob. synch	X, Y												
	Z												

Remarks:

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip. rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5500 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 359°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0.12 in./hr	0 to 360°	0 to 150 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 1%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 800 n. mi/100–150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 46 REQUIREMENTS NSF, University of Miami- Research on Oceanography and Environmental Parameters and Equatorial Current System

Geographic location		Atlantic and Pacific 12°N to 12°S																			
Vertical layer		Unk	→	→		Unk														Sfc	Sfc
Range		0 to 360°	0.1 to 5 kts	34 to 37 ‰		7 to 32°C														0 to 360°	Not stated
Maximum error		10°	0.5 kts	0.01 ‰		0.02°C														2°	0.5 kts or 1%
Duration of ob.		Unk	→	→		Unk														Unk	Unk
Sampling intensity	X, Y	Unk	→	→		15 to 30 n. mi														Unk	Unk
	Z	Unk	→	→		At 1–10 m†														N.A.	N.A.
	Time	24 hrs	→	→		24 hrs														24 hrs	24 hrs
Ob. synch.	X, Y	Not stated	Not stated	Not stated		Not stated														Not stated	Not stated
	Z																				

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The X, Y spacing of 15 to 30 n. mi: Tentative "system" has initial spacing of 600 n. mi in DO.
- The Z sampling intensity: Tentative "system" IAPSO levels are more gross.
- The "not stated" and "unknown" requirements: Tentative "system" may not satisfy some of these requirements if they are more stringent than "system" values

Requirements not met and why

- Oxygen, Tidal Fluctuation, and Vertical Current: Uncertainty about ob. from buoy unattended for long periods.

*These are 1967 C a requirements not refined

†10 m from 0–30, 1–5 m from 30–120 m, 8 m from 120–150 m

REFINED AMO # 49 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen	Tidal fluctuation	Vertical current									
Geo. location		12°N to 12°S Atlantic and Pacific											
Vertical layer		Unk	→	→									
Range		1 to 5.5 ml/l	Not stated	Not stated									
Maximum error		0.5 ml/l	Not stated	Not stated									
Duration of ob		Not stated	→	→									
Sampling intensity	X, Y	Not stated	→	→									
	Z	Not stated	→	→									
	Time	24 hrs	→	→									
Ob. synch	X, Y	Not stated	→	→									
	Z	Not stated	→	→									

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo. location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X, Y												
	Z												
	Time												
Ob. synch	X, Y												
	Z												

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

Revised 20 Aug '68

1. TENTATIVELY PROPOSED NDBB SENSING CAPABILITIES

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Curr dir.	Curr speed	Salinity	Sound speed	Water temp	W press depth	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir.	Wind speed
Geographic location	Deep Ocean 60°N to 60°S W. American Coast out to 400 n. mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)	0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/st	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec.	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1060 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 150 kts
Maximum error (5-yr SOA)	5°	0.02 kts or 1%	0.01 ‰	1 fps	0.05°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.7°C	1%	0.01 in./hr	2°	0.5 kts or 5%
Duration of ob.	Inst. or Short period avg. (Representative)																			
Sampling intensity X, Y	≤ 600 n. mi/100—150 n. mi																			
Sampling intensity Z	30 Std. IAPSO levels (+ near bottom)								2 levels	Surface										
Sampling intensity Time	6 hrs/3 hrs																			
Ob. synch. X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 51 REQUIREMENTS NSF, Oregon State University – Research on Wind Stress on the Ocean

Geographic location	100 Mile Square Centered at 45°N, 125°W																			
Vertical layer	Sfc to 200 m	→			85 to 200 m					Sfc			Sfc to +15 m			Sfc to +15 m			Sfc to +15 m	Sfc to +15 m
Range	0 to 360°	Unk to 1.5 kts	31 to 34 ‰		5 to 15°C					Unk to 24 ft			Unk			Unk			Unk	Unk
Maximum error	Unk	→			Unk					Unk			Unk			Unk			Unk	Unk
Duration of ob	5 to 20 min	5 to 20 min	10 to 20 min		5 to 20 min					Inst			Unk			Unk			Unk	Unk
Sampling intensity X, Y	Unk, maybe ~ 5 n. mi	→			→					→			Unk, maybe ~ 25 n. mi	→		→			→	→
Sampling intensity Z	5 lvls	5 lvls	3—5 lvls		5 lvls					Unk			Unk			Unk			Unk	Unk
Sampling intensity Time	Varies/Continuous	→			→					→			→			→			→	→
Ob. synch X, Y	5 min	→			5 min					5 min			5 min			5 min			5 min	5 min
Ob. synch Z	Unk	→			Unk					N/A			Unk			Unk			Unk	Unk

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above could be met with the exception of

- The X, Y sampling intensity of Unk (maybe about 5 or 25 n. mi): Tentative "system" has initial spacing of 100—150 n. mi in CNA.
- The 5 min X, Y synch. of ob: Tentative "system" allows 10 min.
- The "unknown" and "varies" requirements: Tentative "system" may not satisfy some of these requirements if they are more stringent than "system" values.
- meteorological data: Tentative "system" will meet this requirement only to the extent it coincides with "system" parameters.

Requirements not met and why:

- Humidity, Temperature Gradient and Wind Velocity to 1500 ft above the buoy mast: Considered beyond the 5-yr buoy SOA

*These are 1967 data requirements not refined.

REFINED AMO # 51 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 6

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X, Y												
	Z												
	Time												
Ob synch	X, Y												
	Z												

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Humidity	Temperature gradient	Wind speed	Wind direction								
Geo location		100 nm square centered at 45°N, 125°W →											
Vertical layer		Sfc to 500 m	→	→	→								
Range		No entry	→	→	→								
Maximum error		Unk	→	→	→								
Duration of ob		No entry	→	→	→								
Sampling intensity	X, Y	No entry	→	→	→								
	Z	No entry	→	→	→								
	Time	Cont	→	→	→								
Ob synch	X, Y	5 min	→	→	→								
	Z	No entry	→	→	→								

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 40°S) N American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 999 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 1%
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob synch	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 52 REQUIREMENTS NSF, Lamont Geophysical Observatory—Bottom Current Measurements in Deep Basins of Pacific

Geographic location		Deep Ocean Pacific																			
Vertical layer		Bottom 1500 m	Bottom 1500 m			Bottom 1500 m															
Range		0 to 360°	0.04 to 3 kts			-2 to 3°C															
Maximum error		5°	0.08 kts			0.1°C															
Duration of ob		< 10 sec	< 10 sec			< 10 sec															
Sampling intensity	X, Y	1 point	1 point			1 point															
	Z	25 m + at bottom																			
	Time	30 min	30 min			30 min															
Ob synch	X, Y	N/A	N/A			N/A															
	Z	2 min	2 min			2 min															

3 RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why — All requirements listed would be met with the exception of

- Vertical layer if below 5000 m — Tentative "system" only goes down to 5000 m.
- Z sampling intensity of 25 m — Tentative "system" uses standard IAPSO levels (more gross).
- Time sampling intensity of 30 min — Tentative "system" is every 6 hrs

Requirements not met and why

*These are 1967 data requirements, not refined

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED MDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Curr dir	Curr speed	Salinity	Sound speed	Water temp	Water press depth	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Dev Ocean (60°N to 40°S / American Coast out to [illegible] mi)																			
Vertical layer	Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5 yr 90%)	0 to 360°	[illegible] to 10 kts	0 to 42.0 [illegible]	4500 to 5000 fps	5 to 49°C	[illegible] psi	[illegible] to 2 [illegible] lx	40 to 20 db	0 to 70% m	0 to 100 ft	1 to 40 sec	0 to 360°	-5 to 60°C	0 to 10 kv	800 to 999 mb	-25 to 40°C	0.01 to 2.0 ly m	0-12 in. hr	0 to 360°	0 to 160 kts
Max error (5 yr 90%)	5°	0.05 kts or 1%	0.01 0.00	1 fps	0.01°C	0.1%	1 lx	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	1°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.05 in. hr	2°	0.5 kts or 1%
Duration of obs	Inst or Short period avg (Representative)																			
Sampling intensity: X, Y	5 600 m / 100-150 m																			
Sampling intensity: Z	20 std (APSL) levels (+ near bottom)						2 levels			Surface										
Sampling intensity: Time	4 hr / 3 hrs																			
Obs overlap: X, Y, Z	10 min, 1 min																			

*Includes Measurements of Swells

2. REFINED AMOS 54 REQUIREMENTS (SSI Lamont Geophysical Observatory—Curr Meas along Sills—Renewal of Water in Deep Basins)

Geographic location	Gibraltar & Caribbean																			
Vertical layer	Near bottom max 4000 m																			
Range	0 to 360° / 0.2 to 10 kts																			
Measurement error	0.1 kts / 0.3 kts																			
Duration of obs	10 sec / 10 sec																			
Sampling intensity: X, Y	N A except for deep channels where spacing of 2 to 3 m may be necessary																			
Sampling intensity: Z	N A / N A																			
Sampling intensity: Time	20 min / 20 min																			
Obs overlap: X, Y	N A / N A																			
Obs overlap: Z	N A / N A																			

RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and only [illegible] requirements would be met with the exception of

- The depths between 4000 and 5000 m (tentative system limits go to 5000 m although in this type of requirement depth would be met as an exception)
- The [illegible] spacing of 2 [illegible] m (tentative system spacing [illegible] greater)
- The 20 min [illegible] (tentative [illegible] values over [illegible])

Requirements not met and why

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVE PROPOSED NODE SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Curr dir	Curr speed	Salinity	Sound speed	Water temp	Water press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp.	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean 44°N to 60°S / N American Coast out to 400 n. mi																			
Vertical layer	Surface to 6000 m depth									Surface			Top of buoy mast to surface							
Range (5 yr Risk)	0 to 360°	0.05 to 10 kts	0 to 42.0 ppt	4592 to 5600 fps	0 to 40°C	0 to [illegible] psi	0 to 2.0 ly/m	0 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0 to 2.0 ly/m	0 to 12 in./hr	0 to 360°	0 to 150 kts
Max error (5 yr Risk)	5°	0.03 kts or 1%	0.01 % ppt	1 fps	0.01°C	0.1%	1%	1 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	[illegible] in./hr	2°	0.5 kts or 1%
Duration of obs	Inst or Short period avg / Representative																			
Sampling Intensity X Y	600 m / 100-150 m																			
Sampling Intensity Z	20 std LA PRO levels (near bottom)						2 levels			Surface										
Sampling Intensity Time	4 hrs / 3 hrs																			
Obs growth X Y (Z)	10 min, (5 min)																			

*Tentative Measurements 2 Months

3. REFINED ASSESSMENT REQUIREMENTS (MAP New York) General Circulation of the Oceans

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
Geographic location	World Oceans / East Coast/Strong Currents of World Oceans																			
Vertical layer	Surface to bottom / Max 5000 m								Surface to bottom											
Range	0 to 360°	0 to 10 kts	30 to 42 ppt	4592 to 5600 fps	0 to 40°C				0 to 70%/m											
Maximum error	5°	0.03 kts or 1%	0.01 % ppt	1 fps	0.01°C				2%											
Duration of obs	20 min avg								20 min avg											
Sampling Intensity X Y	100 / 100								200 / 200											
Sampling Intensity Z	Std LA PRO levels (0-1000 m) / 2000, 3000, 4000, 5000 m								5 std											
Sampling Intensity Time	6 hrs								6 hrs											
Obs growth X Y	10 min								10 min											
Obs growth Z	1 min								1 min											

4. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The data X Y spacing of 20 n. mi in strong currents and 100-150 n. mi in the LA [illegible] Tentative "systems" spacings of 500 n. mi (X) 100-150 n. mi (Y) are in progress
- The 15 min duration of obs. Tentative "systems" value is 10 min.

Requirements met and why

- Oxygen: Theoretically about 5% from basic constituents for long periods
- Body Plan of Plant and Nutrients: Considered not important for Navy SOA

Page 1

REVISED AUG # 56 [illegible]

TEST AREA PARAMETERS [illegible] FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 8 Aug [illegible]

Parameter		Oxygen											
Time variation		Same as page [illegible]											
Vertical layer		[illegible]											
Range		0 to 6 mg/l [illegible]											
Maximum error		[illegible]%											
Duration of obs		70 min avg											
Sampling intensity	X Y	20/100 100 m [illegible]	20/200 100 m [illegible]										
	Z	[illegible] 100, 1000, 1140, 2000, 1000, 4000, 5000 m											
	Time	6 hrs											
Obs crash	X Y	10 min											
	Z	1 min											

Remarks

PARAMETERS CONSIDERED BEYOND THE STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Nutrients	Eddy flux of heat										
Time variation		Same as page [illegible]											
Vertical layer		[illegible]	[illegible]										
Range		Not stated	[illegible] m										
Maximum error		Not stated	Not stated										
Duration of obs		70 min avg	70 min avg										
Sampling intensity	X Y	20/300 100 m [illegible]											
	Z	[illegible] 100, 1000, 4000, [illegible] m											
	Time	6 hrs	6 hrs										
Obs crash	X Y	10 min	10 min										
	Z	1 min	1 min										

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TEN ATTRIBUTES PRESENTED NOW BY [illegible] CAPABILITIES

Revised 20 Aug 68

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Curr dir	Curr speed	Salinity	Sound speed	Water temp	Water depth	Ambient light	Ambient noise	Trans parency	Wave measurements* Ht	Per	Dir	Air temp	Altitude elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean (50°N to 60°S) / Anywhere Coast out to 600 n mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of boom mast or surface							
Range (3-yr Std.)	0 to 360°	0 to 10 kts	30 to 42 ‰	4500 to 5600 fps	5 to 65°C	0 to [illegible] feet	0 to [illegible] fc	0 to [illegible] db	0 to 100% m	0 to 100 ft	0 to 40 sec	0 to 360°	25 to 40°C	0 to [illegible] kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/min	0.12 in/hr	0 to 360°	0 to 160 kts
Max error (3-yr Std.)	5°	0.02 kts or 1%	0.01 ‰	1 fps	0.1°C	0.1%	1%	1 db	2%	[illegible] ft or 10%	0.1 sec or 1%	5	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in/hr	2°	0.5 kts or 1%
Duration of obs	Inst or Short period avg (Representative)																			
Sampling intensity X, Y	4,000 n mi/100-150 n mi																			
Sampling intensity Z	30 std (APB) levels (+ near bottom)					2 levels				Surface										
Sampling intensity Time	6 hrs/3 hrs																			
Obs. synch X, Y, (Z)	10 min, (1 min)																			

*Including Measurements of Swells

2. REFINED AREAS OF REQUIREMENTS (PER Navy Task 1. Air/Sea Interaction Engineering or Wave Forecasting

Geographic location	World Oceans - East Coast/Strong Current of World Oceans																			
Vertical layer	Sfc to 1000 m				Sfc to 1000 m								Sfc to 20 m	Sfc					Sfc to 20 m	
Range	0 to 360°	to 10 kts	30 to 42 ‰		23 to 60°C								20 to 40°C	0.5 to 1000 mb	20 to 40°C	to 2 ly/min			0 to 360°	0 to 100 kts
Maximum error	5°	0.05 kts or 1%	0.01 ‰		0.01°C									0.1 mb	0.2°C	1%			2°	0.5 kts or 1%
Duration of obs	10 min avg				20 min avg								20 min avg	20 min avg					20 min avg	20 min avg
Sampling intensity X, Y	300/20 n mi				300/20 n mi								300/20 n mi	300/20 n mi					300/20 n mi	300/20 n mi
Sampling intensity Z	1A PBW/1/20				1A PBW/1/20								10/20 m	N/A					10/20 m	10/20 m
Sampling intensity Time	6 hrs				4 hrs								8 hrs	8 hrs					8 hrs	8 hrs
Obs. synch X, Y	10 min				10 min								10 min	10 min					10 min	10 min
Obs. synch Z	1 min				1 min								1 min	N/A					1 min	1 min

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements not fully met and why: All requirements listed in 2 above would be met with the exception of

- The fixed X, Y spacing of 20 n mi in strong currents and 200-300 n mi in the [illegible]. Tentative "variable" spacings of 50 n mi (for 100-[illegible] n mi [illegible]) are the goal.
- The 10 min duration of obs. Tentative "systems" values is 10 min.

Requirements not met and why

- All "grey area" parameters listed at top of pg 1. Uncertainty about obs. from NIMBUS type buoy.
- All parameters listed at bottom of pg 2. Considered beyond 5 yr horiz [illegible].

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen	Total radiation out	Albedo	Dir wave spectrum
Geo. location		Same as page 1 →			
Vertical layer		Sfc to 10 m	Sfc	→	→
Range		0 to 6 cm^3/l	0 to 2 ly/m	0 to 100%	Not stated
Maximum error		10%	Not stated	→	→
Duration of ob.		20 min avg.	→	→	→
Sampling intensity	X, Y	300/20 n. mi	→	→	→
	Z	IAPSO lvls	N/A	→	→
	Time	6 hrs	→	→	→
Ob. synch.	X, Y	10 min	→	→	→
	Z	1 min	N/A	→	→

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Sensible heat flux	Water vapor flux	Reynolds stress	Eddy flux of heat
Geo. location		Same as page 1 →			
Vertical layer		Sfc	→	→	Sfc to 1000 m
Range		0 to 1 ly/m	0 to 4 ly/m	0 to 30 dines/cm^2	0 to 4 ly/m
Maximum error		Not stated	→	→	→
Duration of ob.		20 min avg.	→	→	→
Sampling intensity	X, Y	300/20 n. mi	→	→	→
	Z	N/A	→	→	IAPSO lvls
	Time	6 hrs	→	→	→
Ob. synch.	X, Y	10 min	→	→	→
	Z	N/A	→	→	1 min

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insol intsn	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S/N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr EOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10[illegible] psi	0 to 2.0 ly/m	-80 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1005 mb	25 to 40°C	[illegible] to [illegible] ly/m	[illegible] in. hr	1 to 360°	[illegible] 160 kts
Max error (5-yr EOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	[illegible] in. hr	2°	[illegible] or 6%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)					2 levels				Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 58 REQUIREMENTS NSF, Woods Hole—Study Dynamic Process of the Western North Atlantic

Geographic location		20° N to 40°N, 65°W to 75°W + Moorings of Opportunity Anywhere in World Oceans																			
Vertical layer		Sfc to 5000 m	→	→		Sfc to 5000 m	Sfc to 5000 m							Sfc		Sfc				Sfc	Sfc
Range		0 to 360°	0 to [illegible]	34 to 38 0/00		-2 to 30°C	0 to 750 psi							10 to 30°C		[illegible] to 1050 mb				[illegible] to 360°	[illegible]
Maximum error		10°	[illegible] kts	0.01 0/00		0.01°C	1%							0.1°C		0.2 mb				[illegible]	[illegible]
Duration of ob.		2-1/2 min avg.	Inst			30 sec	Inst							[illegible] min		[illegible] min				[illegible] min	[illegible] min
Sampling intensity	X, Y	6 n. mi in Gulf Stream 20 n. mi outside Stream	→	→		→								100 n. mi		100 n. mi				[illegible] n. mi	[illegible] n. mi
	Z	IAPSO levels ok in some areas Should be flexible for others	→	→		→								N/A		N/A				N/A	N/A
	Time	1 hr	→	→		1 hr	1 hr							1 hr		1 hr				1 hr	1 hr
Ob. synch	X, Y	10 min	→	→		10 min	10 min							10 min		10 min				10 min	10 min
	Z	1 min	→	→		1 min	1 min							N/A		N/A				N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All listed requirements would be met with the exception of

- The X, Y spacing of 6 and 20 n. mi: Tentative "system" spacing is much grosser 600/100 n. mi
- The time sampling intensity of 1 hr: Tentative "system" sampling is every 6 hrs (DO) and 3 hrs (CNA)

Requirements not met and why:

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per.	Dir.	Air temp.	Atmos. elect.	Atmos. press.	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S/N American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy - just to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	2 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	[illegible] n. mi/hr	[illegible] to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	±0.25°C	1%	[illegible] n. mi/hr	[illegible]	[illegible] kts or 5%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 59 REQUIREMENTS NSF, University of Washington—Study of Effluent Waters of the Columbia River

Geographic location		Mouth of the Columbia River to 600 n. mi W, 300 n. mi S and 200 n. mi N																			
Vertical layer		Sfc to 50 m	→	→		Sfc to 50 m															
Range		0 to 360°	0 to 4 kts	2 to 34 0/00		4 to 17°C															
Maximum error		10°	0.5 kts	0.5 0/00		0.02°C															
Duration of ob.		10 min	→	→		10 min															
Sampling Intensity	X, Y	25 n. mi	→	→		25 n. mi															
	Z	0, 3, 6, 9, 12, 15, 20, 25, 30, 40 - 50 m				→															
	Time	2 hrs	→	→		2 hrs															
Ob. synch	X, Y	10 min	→	→		10 min															
	Z	1 min	→	→		1 min															

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The X, Y spacing of 25 n. mi: Tentative "system" has initial spacing of 600 n. mi in DO and 100—150 n. mi in CNA.
- The fine Z sampling intensity: Tentative "system" has only 5 levels in the first 50 m.
- The 2 hr time sampling intensity: Tentative "system" is every 6 hrs (DO)/3 hrs (CNA)

Requirements not met and why

- Oxygen: Uncertainty about ob. from buoy unattended for long periods
- Nutrients, Biological Par., and Sediment Load: Considered beyond the 5-yr buoy SOA

*These are 1967 data requirements not refined

REFINED AMO # 59 REQUIREMENTS (Continued)

Revised [illegible] Aug [illegible]

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTE

Parameter		Oxygen
Geo location		Mouth of the Columbia River to 600 mi W, 300 mi S, and 200 mi N
Vertical layer		Sfc to 50 m
Range		0 to 9 m L/l
Maximum error		0.06 m L/l
Duration of ob		10 min
Sampling intensity	X Y	2.5 n mi
	Z	0, 3, 6, 9, 12, 15, 20, 25, 30, 40 - 50 m
	Time	2 hrs
Ob synch	X, Y	10 min
	Z	10 min

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Nutrients	Biological parameters	Sediment load
Geo location		Same as above →		
Vertical layer		Sfc to 50 m	→	
Range		Unk	→	
Maximum error		Unk	→	
Duration of ob		10 min	→	
Sampling intensity	X, Y	25 n mi	→	
	Z	0, 3, 6, 9, 12, 15, 20, 25, 30, 40 - 50 m	→	
	Time	2 hrs	→	
Ob synch	X, Y	10 min	→	
	Z	1 min	→	

Remarks

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NLBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir	Curr. speed	Salinity	Sound speed	Water temp.	W. pres (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos. press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. Americas Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	-60 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 2%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 800 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch	X, Y, (Z)	10 min, (1 min)																			

*Include Measurements of Swells

2. REFINED AMOS # 62 REQUIREMENTS Smithsonian Institution

Geographic location																					
Vertical layer																					
Range																					
Maximum error																					
Duration of ob																					
Sampling Intensity	X, Y																				
	Z																				
	Time																				
Ob. synch	X, Y																				
	Z																				

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why:

Requirements not met and why

- Biological Growth: Judged better done by other means—such as the buoy tenders taking ob. from special suspended surfaces on buoy each time buoy is visited.
- Biological Collection: Considered beyond 5-yr buoy SOA.

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 75

Parameter		Biological growth											
Geo location		Not stated											
Vertical layer		Sfc to 900 ft											
Range		Not stated											
Maximum error		Individual whole organisms											
Duration of ob		Not stated											
Sampling intensity	X, Y	10 n mi											
	Z	10, 200, 400, 600, - 900 ft											
	Time	48 hrs											
Ob synch	X, Y	Not stated											
	Z	Not stated											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART AND THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Biological collection											
Geo location		Not stated											
Vertical layer		Sfc to 900 ft											
Range		Not stated											
Maximum error		Individual whole organisms											
Duration of ob		Not stated											
Sampling intensity	X, Y	10 n mi											
	Z	10, 200, 400, 600, - 900 ft											
	Time	48 hrs											
Ob synch	X, Y	Not stated											
	Z	Not stated											

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir.	Curr. speed	Salinity	Sound speed	Water temp.	W press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* H	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	80 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	0-12 in. hr	0 to 360°	0 to 160 kts
Bias error (5-yr SOA)		5°	0.03 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in. hr	2°	0.5 kts or 7
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling intensity	X, Y	5 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 55 REQUIREMENTS USN, Mine Defense Laboratory—Mine Defense Including Inshore Undersea Warfare

Geographic location		Gulf of Mexico out to 200 m Depths																			
Vertical layer		Sfc to bottom max 200 m	→	→	→	Bottom max 200 m				Sfc		Sfc	Sfc						Sfc	Sf
Range		0 to 360°	0.1 to 5 kts	0 to 40 ‰	4300 to 5500 fps	0 to 35°C	1/1000 to 2.5 psid			0.25 to 20 ft		0 to 360°	-5 to 40°C						0 to 360°	1 to 100 kts
Maximum error		10°	0.5 kts	0.1 ‰	6 fps	0.1°C	0.1 in. of water			0.25 ft		15°	1°C						1°	3 kts
Duration of ob.		Inst	Inst	Inst or 5 sec	1 sec	1/10 sec	30 min record			30 min record		30 min record	1 sec						1 min avg	1 min avg
Sampling intensity	X, Y	1 n. mi	1 n. mi	1200 ft	→	→	30 n. mi			10 n. mi		10 n. mi	10 n. mi						10 n. mi	10 n. mi
	Z	16 m	16 m	6 m	16 m	5 m	N/A			N/A		N/A	N/A						N/A	N/A
	Time	1 hr	1 hr	5 min	Var	5 min	2 sec			3 hrs		3 hrs	3 hrs						3 hrs	3 hrs
Ob synch	X, Y	5 min	5 min	1 min	5 sec	1 min	5 min			5 min		5 min	5 min						5 min	5 min
	Z	5 min	5 min	1 min	1 min	1 min	N/A			N/A		N/A	N/A						N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The 30 min duration of ob: Tentative "system" is only up to 10 min.
- The fine scale X, Y spacing: Tentative "system" initial spacing is about 100 n. mi (CNA).
- The 16 m Z sampling intensity: Tentative "system" uses IAPSO levels which are more gross.
- The time sampling intensity and X, Y synch of ob: Tentative "system" not as stringent.

Requirements not met and why

- Turbidity and Electrical Volume Conductivity: Uncertainty about ob. from buoy unattended for long periods

*These are 1967 data requirements not refined

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 6[illegible]

Parameter		Turbidity	Elec Vol Conduct										
Geo location		G of Mexico out to 200 m depth											
Vertical layer		Unk	Unk										
Range		1 to 1000 ppm	0 to 6 mho/m										
Maximum error		5 ppm	5%										
Duration of ob		Inst or 5 sec	Inst or 5 sec										
Sampling intensity	X Y	1200 ft	1200 ft										
	Z	1 per col	5 m										
	Time	3 hr	5 min										
Ob synch	X Y	5 min	1 min										
	Z	2 min	1 min										

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X Y												
	Z												
	Time												
Ob synch	X Y												
	Z												

Remarks

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED MDBR SENSING CAPABILITIES

Revised 20 Aug 68

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Curr dir	Curr speed	Salinity	Sound speed	Water temp	H press depth	Ambient light	Ambient noise	Trace pareers	Ave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Visibility	Precip rate	Wind dir	Wind speed
Geographic Location	Deep Ocean 40°N to 44°N, American Coast out to 400 n mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of buoy or its surface							
Range (5 yr MOA)	0 to 35.0°	0.05 to 10 kts	0 to 42.0‰	4500 to 5000 fps	5 to 40°C	0 to 10 psi	0 to 2.0 fc by m	40 to 70 db	70% m	0 to 100 ft	0 to 2 sec	0 to 360°	0.5 to 40°C	0 to 1 kv	0 to 1000 mb	0 to 40°C	0 to 1 kv	0 to 2 hr	0 to 360°	0 to 100 kts
Max error (5 yr MOA)	1°	0.05 kts or 1%	0.01 0.00	1 fps	0.01°C	0.1%	1%	1 db	2%	2 ft or 1%	0.1 sec or 1%	1°	0.1°C	0.1 kv	1 mb	0.1°C	1%	0.05 hr	1°	1 kts or 1%
Duration of ob	Inst or Short period avg (Representative)																			
Sampling Intensity X, Y	0.600 n mi/100-150 n mi																			
Sampling Intensity Z	30 BVX LA PRO Levels (+ near bottom)						2 levels			Surface										
Sampling Intensity Time	6 hrs/5 yrs																			
Ob synch X, Y (Z)	10 min, (1 min)																			

*Includes Measurements of Benthic

3. REFINED AMOD 0 66A REQUIREMENTS NOD, AIW Environmental Prediction, Oceanographic Environmental Prediction Techniques R&D Test and Evaluation

Geographic Location	Within Major Current Areas Outside Major Current Areas (Northern Hemisphere)																			
Vertical layer			Sfc		Sfc					Sfc			Sfc	Sfc			Sfc	Sfc		
Range			12 to 28 σ_{Ave}		1 to 20°C					0 to 50 ft	1 to 20 sec	0 to 360°	12 to 40°C	0 to 1967 mb	12 to 40°C		0 to 360°	0 to 120 kts		
Maximum error			0.03 σ_{Ave}		0.2°C					10% or 2 ft	2 sec	20°	1.0°C	2 mb	0.2°C		1°	1 kts		
Duration of ob			Inst		Inst					20 min avg			Inst	Inst	Inst			1 min		
Sampling Intensity X, Y			30/80 n mi		30/80 n mi					300 n mi			300 n mi	300 n mi	300 n mi		0.6 n mi	0.6 n mi		
Sampling Intensity Z			N/A		N/A					N/A			N/A	N/A	N/A		N/A	N/A		
Sampling Intensity Time			6 hrs		6 hrs					12 hrs			6 hrs	6 hrs	6 hrs		6 hrs	6 hrs		
Ob synch X, Y			20 min		20 min					20 min				20 min	20 min			20 min		
Ob synch Z			N/A		N/A					N/A				N/A	N/A			N/A		

2. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed would be met with the exception of
* The X, Y spacing of 30/80 n mi within/outside major currents and 25% or 30% n mi in DC. Tentative "system" has initial spacing of [illegible]

Requirements not met and why

*These are 1967 requirements not refined

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

Revised 6 Aug 85

I. TENTATIVELY PROPOSED MIN. SENSING CAPABILITIES

Parameters / Characteristics	OCEANOGRAPHIC: Surf dir	Surf speed	Salinity	Sound speed	Water temp	Sea press depth	Ambient light	Ambient noise	Trans parency	Wave measurements* Ht	Per	Dir	METEOROLOGICAL: Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean (65°N to 65°S) / American Coast out to 400 n. mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top 4 hours meet to surface							
Range (5 yr RMA)	5 to 35°	0.05 to 10 kts	5 to 43 ppt	4500 to 5000 fps	5 to 32°C	5 to 4000 psi	0 to 10 lx	0 to 1 lx	0 to 100 m	0 to 20 ft	4 to 20 sec	0 to 360°	-20 to 50°C	0 to 100 kv	800 to 1000 mb	20 to 40°C	-20 to 25°C	0 to 100 in/hr	0 to 360°	0 to 100 kts
Max error (5 yr RMA)	1°	0.03 kts or 1%	0.01 ppt	2 fps	0.01°C	1%	1%	1 lx	1%	2 ft or 1%	1 sec or 1%	1°	0.1°C	1 kv	1 mb	1°C	1°C	0.1 in/hr	2°	1 kt
Duration of obs	Inst or short period avg (Representative)																			
Sampling intensity: X, Y	≤ 600 n. mi / 100-150 n. mi																			
Sampling intensity: Z	30 Std (LAPOS) levels (+ mixed lyr)						2 levels			Surface										
Sampling intensity: Time	2 hrs / 5 hrs																			
Obs cycle: X, Y, Z	10 min, 1 min																			

*Includes Measurements of Swells

II. REFINED AND NEW REQUIREMENTS NOW: Anti-Sub Warfare Oceanographic Environmental Prediction Techniques (ASW OPEVAL) and Evaluation

Geographic location	Within Major Current Areas	Outside Major Current Areas	Northern Hemisphere															
Vertical layer	Sfc to 300 m				Sfc to 300 m	Sfc to 300 m												
Range	0 to 30°C	0.01 to 5 kts	32 to 37 ppt		2 to 16°C	to 300 m												
Maximum error	10°	0.1 kts	0.02 ppt		0.2°C	3% or 5 ft												
Duration of obs	5 min avg	5 min avg	Inst		Inst	Inst												
Sampling intensity: X, Y	5.0 / 80 n. mi	3.5 / 5 n. mi	5.0 / 4.0 n. mi		5.0 / 4.0 n. mi	4.0 / 4.0 n. mi												
Sampling intensity: Z	12 m 1st 10 m; then 25 m		12 m		12 m	12 m												
Sampling intensity: Time	4 hrs		6 hrs		6 hrs	6 hrs												
Obs cycle: X, Y	10 min	10 min	10 min		10 min	10 min												
Obs cycle: Z	5 min	5 min	1 min		5 min	5 min												

I. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed would be met with the exception of

- The X, Y spacing of 50-80 n. mi and 50-400 n. mi within/outside major currents. Tentative "Systems" has initial spacing of 60nm min/max and 10-100 nm USA.
- The Z sampling intensity of 12 and 25 m. Tentative "systems" LAPOS levels are more gross

Requirements not met and why

*These are 1987 data requirements, not refined

ASSESSMENT SHEET FOR DEFINED DATA REQUIREMENTS

I. TENTATIVELY PROPOSED NODE SENSING CAPABILITIES

Revised 20 Aug 68

Parameters / Characteristics	OCEANOGRAPHIC: Current dir	Current speed	Salinity	Sound speed	Water temp	Water pressure (depth)	Ambient light	Ambient noise	Trans parency	Wave measurements* Ht	Per	Dir	METEOROLOGICAL: Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean [illegible] N to [illegible] N American Coast out to 400 n mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (3-yr MOA)	0 to 360	0.25 to 10 kts	1 to 42.5 ppt	4500 to 5400 fps	5 to 44°C	0 to [illegible] psi	0 to 2.0 by m	80 to 2.0 db	0 to 7.95 m	to 100 ft	1 to 40 sec	0 to 360°	[illegible] to 60°C	0 to [illegible]	[illegible] to 1099 mb	[illegible] to 40°C	[illegible] to [illegible] cal	[illegible]	0 to 360°	0 to 150 kts
Max error (3-yr MOA)	5°	0.05 kts or 1%	0.01 ppt	1 fps	0.01°C	0.1%	1%	5 db	2%	0.2 ft	0.1 sec or 1%	5°	0.1°C	[illegible]	0.1 mb	[illegible]	[illegible]	[illegible]	360°	[illegible] kts or [illegible]
Duration of ob	Inst or Short period avg (Representative)																			
Sampling Intensity: X, Y	400 n mi or 100-150 n mi																			
Sampling Intensity: Z	30 std. LAPSO levels (+ near bottom)						2 levels			Surface										
Sampling Intensity: Time	6 hrs or 1 hrs																			
Ob speed: X, Y (Z)	10 min, 1 min																			

*Includes Measurements of Swells

II. REFINED AND 6.6C REQUIREMENTS MEASAW Environmental Prediction Oceanographic Environmental Prediction Techniques R&D Test and Evaluation

Geographic location	Within Major Current Areas/Outside Major Current Areas/Northern Hemisphere																		
Vertical layer	305 m to bottom				305 m to bottom	305 m to bottom													
Range	0 to 360°	0.01 to 5 kts	32 to 38 ppt		2 to 36°C	305 m to 6100 m													
Maximum error	1°	0.1 kts	0.05 ppt		0.2°C	3% or 5 ft													
Duration of ob	5 min avg	5 min avg	Inst		Inst	Inst													
Sampling Intensity: X, Y	400 n mi				400 n mi	400 n mi													
Sampling Intensity: Z	305 m				305 m	305 m													
Sampling Intensity: Time	6 hrs	6 hrs	3 hrs		12 hrs	6 hrs													
Ob speed: X, Y	30 min				30 min	30 min													
Ob speed: Z	5 min				5 min	5 min													

RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed would be met with the exception of

- The vertical layer of 305 m to bottom when deeper than 5000 m. Tentative "system" depths go to only 5000 m
- The X, Y spacing of 400 n mi when in DG. Tentative "system" has initial spacing of 600 n mi in DG
- The Z sampling intensity of 305 m. Tentative "system" LAPSO levels are more gross

Requirements not met and why

*There are [illegible] requirements not defined

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

Revised 20 Aug '68

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	Water press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) / N. American Coast out to 400 n. mi									Surface			Top of buoy mast to surface							
Vertical layer		Surface to 5000 m depth																			
Range (5 yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 100%	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0 to 12 in./hr	0 to 360°	0 to 160 kts
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.03°C	0.1%	5%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 1%
Duration of ob		Inst or Short period avg. (Representative)																			
Sampling Intensity	X, Y	60 n. mi / 100–150 n. mi																			
	Z	20 Std. IAPSO levels (near bottom)						2 levels			Surface										
	Time	6 hrs / 3 hrs																			
Ob synch	X, Y (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 76 REQUIREMENTS (ORL, Penn St.—Large-scale Factors Affecting Transmission of Underwater Sound

Geographic location		World Oceans																			
Vertical layer		Sfc to 5000 m	→					Sfc inc. ref	Sfc to 5000 m	Sfc to 5000 m	Sfc	→		10 and 20 ft		Sfc	10 and 20 ft	Sfc	Sfc	10 and 20 ft	10 and 20 ft
Range		0 to 360°	0 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 100%	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C		800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0 to 12 in./min	0 to 360°	to 160 kts
Maximum error		5°	.03 kts or 1%	0.01 0/00	1 fps	0.1°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C		0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 1%
Duration of ob		2 min	→								Avg	→		Inst		Inst	→		2 min	→	
Sampling Intensity	X, Y	300 n. mi	→											→		300 n. mi					→
	Z	IAPSO std levels	→					2 levels	→		Sfc	→		10 ft		Sfc	10 ft	Sfc	Sfc	10 ft	10 ft
	Time	6 hrs	→											→		6 hrs					→
Ob synch	X, Y	10 min	→											→		10 min					→
	Z	1 min	→								N/A	→		1 min		N/A	1 min	N/A	N/A	1 min	1 min

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The X, Y spacing of 300 n. mi in DO. Tentative "system" spacing is about 600 n. mi

Requirements not met and why

- Pictures of Bottom and Propagation Loss: Judged better done by other means
- Ice Accumulation and Density: Uncertainty about ob. form NDBS type buoy
- Bottom Type: Considered beyond 5-yr buoy SOA

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 88

Parameter		Propag. loss	Bottom photos	Ice accum.	Water density								
Geo location		World oceans →											
Vertical layer		Not stated	Bottom	Sfc	Not stated								
Range		Not stated	→	→	→								
Maximum error		Not stated	→	→	→								
Duration of ob		Not stated	→	→	→								
Sampling intensity	X, Y	300 n. mi	→	→	→								
	Z	Not stated	N/A	N/A	Not stated								
	Time	6 hrs	→	→	→								
Ob. synch	X, Y	10 min	N/A	10 min	10 min								
	Z	1 min	N/A	N/A	1 min								

Remarks:

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Bottom type											
Geo location		World oceans											
Vertical layer		Bottom											
Range		Not stated											
Maximum error		Not stated											
Duration of ob		Not stated											
Sampling intensity	X, Y	300 n. mi											
	Z	N/A											
	Time	6 hrs											
Ob. synch	X, Y	N/A											
	Z	N/A											

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '69

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos. press.	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S/N Americas Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42.0 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. LAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hr																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMG # 77 REQUIREMENTS ORL, Penn. St.—Small-scale Factors Affecting Transmission of Underwater Sound

Geographic location		World Oceans—Selected Areas																			
Vertical layer		Sfc to 5000 m	→	→	→	→	→	Sfc inc-ref	Sfc to 5000 m	Sfc to 5000 m	Sfc	→	→	10 and 20 ft		Sfc	10 and 20 ft	Sfc	Sfc	10 and 20 ft	10 and 20 ft
Range		0 to 360°	0 to 5 kts	0 to 42.0 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 100%	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°		800 to 1099 mb	-25 to 40°C	.01 to 2.0 ly/m	0 to 12 in./hr	0 to 360°	0 to 160 kts
Maximum error		5°	.05 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C		0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst	→	→	→	→	→	→	→	→	Avg.	→	→	Inst		Inst	→	→	→	→	→
Sampling Intensity	X, Y	5.5 n. mi grid buoys	→	→	→	→	→	→	→	→	→	→	→	→		→	→	→	→	→	→
	Z	20 levels; closer spacing near top	→	→	→	→	→	2 lvls	2 lvls	2 or 3 lvls	N/A	→	→	10 ft		N/A	10 ft	N/A	N/A	10 ft	10 ft
	Time	1 min	→	→	→	→	→	→	→	→	→	→	→	→		1 min	→	→	→	→	→
Ob. synch	X, Y	1 min	→	→	→	→	→	→	→	→	→	→	→	→		1 min	→	→	→	→	→
	Z	1 min	→	→	→	→	→	N/A	1 min	1 min	N/A	1 min	→	→		N/A	1 min	N/A	N/A	1 min	1 min

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why — All listed requirements would be met with the exception of

- The X, Y spacing of 5.5 n. mi: Tentative "system" spacing is about 600/100 n. mi.; one location might coincide.
- The 1 min frequency of ob: Tentative "system" values are 6/3 hr
- The 1 min X, Y synch. of ob: Tentative "system" X, Y synch. is 10 min

Requirements not met and why

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per.	Dir.	Air temp.	Atmos elect.	Atmos press	Dew point	Insolation	Precip rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5050 fps	-5 to 10°C	0 to 10⁴ psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 150 kts
Max error (5-yr SOA)		5°	0.05 kts or 1%	0.01 ‰	1 mps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100–150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 79 REQUIREMENTS USN Mar. Eng. Lab.—Testing of Deeply Submerged Machinery

Geographic location		East Coast and Caribbean 1st 5 yrs) World-wide Later on																			
Vertical layer		Bottom only	Max 310 m	→		Bott. to 16 m abv.		Bott. max 310 m		Bott. max 310 m											
Range		0 to 360°	0.01 to 2 kts	30 to 35 ‰		0 to 10°C		0 to 2.0 ly/m		0 to 70%/m											
Maximum error		10°	0.1 kts	0.1 ‰		0.01°C		1%		2%											
Duration of ob.		1 min	→	→		1 min		1 min		1 min											
Sampling Intensity	X, Y	1 pt only	→	→		1 pt only		1 pt only		1 pt only											
	Z	Bottom only	→	→		1, 5, 3, 6, 6, 9, 18 m abv. bott.		Bottom only		Bottom only											
	Time	30 min	→	→		30 min		30 min		30 min											
Ob. synch	X, Y	N/R	→	→		N/R		N/R		N/R											
	Z	N/A	→	→		1 min		N/A		N/A											

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of
- The 30-min frequency of ob: Tentative "system" values are 6 hr DO/3 hr CNA.
- The Z sampling intensity for water temperature: Tentative "system" spacing is more gross (1 level).

Requirements not met and why
- Oxygen, pH, and Turbidity: Uncertainty about ob. from NDBS type buoy.
- EH: Considered beyond 5-yr buoy SOA

REFINED AMO # 79 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug. 68

Parameter		Oxygen	Turbidity	pH									
Geo location		East Coast and Caribbean	→										
Vertical layer		Bottom only	→										
Range		0 to 9 ml/l	Not stated	6 to 8 pH units									
Maximum error		0.2 ml/l	Not stated	0.2 pH units									
Duration of ob.		1 min	→										
Sampling intensity	X, Y	1 pt only	→										
	Z	Bottom only	→										
	Time	30 min	→										
Ob. synch.	X, Y	N/R	→										
	Z	N/A	→										

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		EH											
Geo location		East Coast and Caribbean											
Vertical layer		Bottom only											
Range		Not stated											
Maximum error		0.3 millivolts											
Duration of ob.		1 min											
Sampling intensity	X, Y	1 pt only											
	Z	Bottom only											
	Time	30 min											
Ob. synch	X, Y	N/R											
	Z	N/A											

Remarks

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp.	W press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per.	Dir.	Air temp.	Atmos. elect.	Atmos. press.	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) / American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr BOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec.	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr BOA)		5°	0.02 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi / 140—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs / 3 hrs																			
Ob. synch	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 8) REQUIREMENTS USN Mar. Eng. Lab.—Measure Normal Geomagnetic Noise

Geographic location																					
Vertical layer																					
Range																					
Maximum error																					
Duration of ob.																					
Sampling Intensity	X, Y																				
	Z																				
	Time																				
Ob. synch	X, Y																				
	Z																				

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why

Requirements not met and why

- Geomagnetic Field Intensity: Uncertainty about ob. from an NDBS type buoy.

"GR" - "SEA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug. 68

Parameter		Geomag. field int. in certain freq. bands											
Geo location		Cont. Shelf and dp. water within telemetry distance of land											
Vertical layer		Sfc											
Range		-30 to 30 gamma											
Maximum error		0.5 gamma											
Duration of ob		Inst.											
Sampling intensity	X, Y	4 buoys in a square 20 n. mi apart											
	Z	N/A											
	Time	Cont.											
Ob synch	X, Y	Millisecond											
	Z	N. A											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob.													
Sampling intensity	X, Y												
	Z												
	Time												
Ob synch	X, Y												
	Z												

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NTPS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per.	Dir.	Air temp	Atmos. elect	Atmos. press	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean 400°N to 40°S/N America Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMOS 81 REQUIREMENTS USN, Underwater Sound Laboratory—Acoustic Raypath Studies

Geographic location		Block Island Sound (Block I/South of Bermuda out to 150 n. miles																			
Vertical layer		Sfc to bottom	→								Sfc	→				Sfc				Sfc	Sfc
Range		0 to 360°	0.05 to 5 kts	30 to 38 0/00	4500 to 5300 fps	0 to 30°C	0 to 9700 psi				0 to 40 ft	1 to 30 sec	0 to 360°			900 to 1060 mb				0 to 360°	0 to 65 kts
Maximum error		6°	0.25 kts	0.05 0/00	0.01%	0.2°C	0.25%				1 ft or 5%	0.1 sec	5°			1 mb				7°	2 kts
Duration of ob		2 min	→								5 min	→				5 min				5 min	5 min
Sampling Intensity	X, Y	9 n. mi/var	→								9 n. mi/var	→				9 n. mi/var				9 n. mi/var	
	Z	5 m	→								N/A	→				N/A				N/A	N/A
	Time	5 min/10 min	→								5 min/20 min	→				5 min/20 min				5 min/20 min	
Ob synch	X, Y	Unk	→								Unk	→				Unk				Unk	Unk
	Z	Unk	→								Unk	→				Unk				Unk	Unk

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The X, Y spacing of 9 n. mi (CNA) and variable (DO): Tentative "system" uses initial spacing of 600 n. mi in DO and 100—150 n. mi in CNA.
- The Z sampling intensity of 5 m: Tentative "system" standard IAPSO levels are more gross.
- The unknown synch. of ob. when less than 10 min (X, Y) and 1 min (Z): Tentative "system" allows 10 min (X, Y) and 1 min (Z).

Requirements not met and why

- Inclination: Uncertainty about ob. from buoy unattended for long periods.

*These are 1967 data requirements not refined.

"GREY AREA" PARAMETERS WORTH QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Inclination	Mooring Lines										
Geo location		Block Island Sound (3 locations of Bar out to 150 n mi											
Vertical layer		Surf to bottom											
Range		N A											
Maximum error		[illegible]											
Duration of ob		2 min											
Sampling intensity	X Y	9 n mi / year											
	Z	[illegible] m											
	Time	5 min / 20 min											
Ob synch	X Y	Unk											
	Z	Unk											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X Y												
	Z												
	Time												
Ob synch	X Y												
	Z												

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

TENTATIVELY PROPOSED SENSE SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics	OCEANOGRAPHIC: Current dir	Current speed	Salinity	Sound speed	Water temp	Water press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	METEOROLOGICAL: Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean (60°N to 60°S) / Anywhere Coast out to 400 n mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of busy mast to surface							
Range (5 yr Stat)	0 to 360°	0.5 to 10 kts	0 to 42 0/00	4500 to 5000 fps	5 to 40°C	0 to 10⁴ psi	0 to 2 0 ly/m	60 to 20 db	0 to 10%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0 01 to 2 0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Meas error (5 yr Stat)	5°	0 05 kts or 1%	0 01 0/00	1 fps	0 01°C	0 1%	1%	3 db	2%	0 2 ft or 10%	0 1 sec or 1%	5°	0 1°C	01 kv	0 1 mb	0 2°C	1%	0.01 in/hr	2°	0 5 kts or 3%
Duration of ob	Inst or Short period avg (Representative)																			
Sampling Intensity X, Y	5 600 n mi (100-150 n mi)																			
Sampling Intensity Z	50 Std (APMO levels (+ near bottom))					3 levels				Surface										
Sampling Intensity Time	4 hrs/3 hrs																			
Ob synch X, Y, Z	10 min, (1 min)																			

*Including Measurements of Swells

A. REFINED AMOS R2 REQUIREMENTS USN MSR - DC - Test Sea worthiness of Ships

Geographic location	Anywhere in North Atlantic (or Pacific) where Sea State 4 to 6 is Observed																			
Vertical layer										Sfc		Sfc								
Range										0 to 100 ft		0 to 360°								
Measurement error										10%		5%								
Duration of ob										30 min		30 min								
Sampling Intensity X, Y										100 to 600 n mi										
Sampling Intensity Z										N/A		N/A								
Sampling Intensity Time										4 hrs		4 hrs								
Ob synch X, Y										N/A		N/A								
Ob synch Z										N/A		N/A								

1. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: Wave Height and Direction Spectra would probably be met with the exception of

- The 30 min duration of ob: Tentative "system" value is up to 10 min
- The 4 hr frequency of ob: Tentative "system" value is 8 hrs in Deep Ocean
- Sea State: Some measure of sea state can be approximated from wave measurements - whether the coding will be exactly what is wanted must be resolved

Requirements not met and why

SHELF AREA PARAMETERS & REQUIREMENTS FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter	Sea state											
Geo location	Anywhere in U. Atlantic or Pacific where sea state 4 - 6 is encountered											
Vertical layer	Sfc											
Range	0 to 9 scale											
Measurement error	10%											
Duration of ob	15 min											
Sampling intervals: X, Y	100 m 100 m min											
Sampling intervals: Z	N/A											
Sampling intervals: Time	Cont											
Ob errors: X, Y	N/A											
Ob errors: Z	N/A											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5 YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter												
Geo location												
Vertical layer												
Range												
Measurement error												
Duration of ob												
Sampling intervals: X, Y												
Sampling intervals: Z												
Sampling intervals: Time												
Ob errors: X, Y, Z												

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED MODS REMOTE CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics	OCEANOGRAPHIC: Curr dir	Curr speed	Salinity	Sound speed	Water temp	Pressure (depth)	Ambient light	Ambient noise	Transparency	Wave measurements*: Ht	Per	Dir	METEOROLOGICAL: Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean (60°N to 6[illegible]°N) / American Coast out to 600 n mi																			
Vertical layer	Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (3 yr SOA)	0 to 360°	0.25 to 10 kts	0 to 42.0 ppt	4570 to 5400 fps	[illegible] to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	80 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1080 mb	25 to 40°C	0.01 to 2.0 ly/m	0.12 in./hr	0 to 360°	0 to 160 kts
Max error (3 yr SOA)	5°	0.02 kts or 2%	0.01 ppt	1 fps	0.1°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob	Inst or short period avg (Representative)																			
Sampling intensity: X, Y	≥ 500 n mi / 100-150 n mi																			
Sampling intensity: Z	20 std (APBO levels (1 near bottom))						2 levels			Surface										
Sampling intensity: Time	6 hrs / 3 hrs																			
Ob speed: X, Y, Z	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMOD 64 REQUIREMENTS (NSF, Scripps Inst of Oceanography - Basic Research on North Pacific Ocean and Atmosphere

Geographic location	Pacific Ocean 20°N to 60°N and 110°W to 130°E, California Current 22.5°N to Columbia River																			
Vertical layer	Sfc to 3000 m				Sfc to 3000 m	Sfc to 3000 m	Varies		Varies	Sfc			Sfc to 15 m		Sfc	Sfc to 15 m	Sfc	Sfc	Sfc to 15 m	Sfc to 15 m
Range	0 to 360°	0.25 to 10 kts	0 to 42.0 ppt		5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m		0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C		800 to 1080 mb	25 to 40°C	0.01 to 2.0 ly/m	0.12 in./hr	0 to 360°	0 to 160 kts
Maximum error	5°	0.02 kts or 1%	0.01 ppt		0.01°C	0.1%	1%		2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C		0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob	Cont at sfc short period STL [illegible]		Inst		Inst or short per STL [illegible]		Cont		Inst or short per avg						Inst	Inst	Cont	Inst	Cont	Cont
Sampling intensity: X, Y	500/100 n mi				500/100 n mi				500/100 n mi						500/100 n mi					
Sampling intensity: Z	APBO lvls				APBO lvls	APBO lvls	2 lvls		2 lvls	N/A			5 - 15 m		Sfc	5 - 15 m	Sfc	Sfc	5 - 15 m	5 - 15 m
Sampling intensity: Time	1 hr				1 hr				1 hr						1 hr					
Ob speed: X, Y	10 min				10 min				10 min						10 min					
Ob speed: Z	1 min				1 min				1 min	N/A					N/A					

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All the requirements listed in 2 above would be met with the exception of

- The continuous duration of ob: Tentative "system" has up to a [illegible] min average.
- The 1 hr frequency of ob: Tentative "system" has volume of [illegible] hrs

Requirements not met and why

- All "grey area" parameters listed at top of pg 2: Judged better measured by other means or uncertainty about ob from buoy unattended for long periods
- All other parameters listed at bottom of pg 2: Considered beyond 5 yr SOA

REFINED AMO # 54 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Total cloud amount	Tidal fluctuation	Mooring load	Photo marine life	Sub-surface insolation	Radiation out	Carbon dioxide	Vertical current	Biological growth	Fog		
Geo location		Same as Page 1 →											
Vertical layer		Not stated	Bottom	Sfc	Sfc	Sfc to 10 m	Sfc	Sfc	2 levels	Sfc	Sfc		
Range		0 to 100%	Not stated	0 to 15000 lb	Not stated	0 to 2 ly/hr	-10 to 60°C	50 to [illegible] ppm	0 to 0.5 kts	Not stated	Yes or no		
Maximum error		10%	Not stated	5%	Not stated	1%	0.5°C	0.1 ppm	0.01 kts	Not stated	N/A		
Duration of ob		Inst.	→	→	→	Cont.	Cont.	Inst.	Cont.	1 yr	Inst.		
Sampling intensity	X, Y	500/100 n.mi	→	→	→	→	→	→	→	→	→		
	Z	N/A	Bottom	N/A	N/A	1 - 10 m	N/A	N/A	2 levels	N/A	N/A		
	Time	1 hr	→	→	→	→	→	→	→	1 yr	1 hr		
Ob. synch.	X, Y	10 min	→	→	→	→	→	→	→	N/A	1 min		
	Z	N/A	→	→	→	1 min	N/A	1 min	1 min	N/A	N/A		

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		Heat Flux	Cloud type	Cloud base	Dust								
Geo location		Same as page 1 →											
Vertical layer		Sfc	Not stated	Sfc to 10,000 ft	+15 m								
Range		Not stated	Optical or radar density	0 to 10,000 ft	Filter								
Maximum error		Not stated	Probably large	10%	Not stated								
Duration of ob.		Cont.	Inst.	Inst.	1 wk								
Sampling intensity	X, Y	500/100 n. mi	→	→	→								
	Z	N/A	N/A	N/A	N/A								
	Time	1 hr	→	→	1 wk								
Ob. synch.	X, Y	10 min	→	→	→								
	Z	N/A	→	→	→								

Remarks

Page 7

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SCHEDULING CAPABILITIES

Revised 22 Aug '60

Characteristics \ Parameters		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr speed	Salinity	Sound speed	Water temp.	W. press. (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect.	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (66°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 3.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 1%
Duration of ob.		Inst. or short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/160—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 85 REQUIREMENTS AEC, Scripps Inst. of Oceanography—Research on Near-bottom Currents

Geographic location		Deep Pacific, Primarily Deep Currents																			
Vertical layer		Sfc to 10,000 meters																			
Range		0 to 360°	0 to 1.0 kt																		
Maximum error		10°	.005 kts																		
Duration of ob.		Inst	Inst																		
Sampling Intensity	X, Y	Unk	Unk																		
	Z	3 m from bottom	3 m from bottom																		
	Time	1 hr	1 hr																		
Ob. synch	X, Y	1 min	1 min																		
	Z	Unk	Unk																		

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why Current Velocity would be met with the exception of

- The 3 m from bottom requirement at depths greater than 5000 m: Tentative "system" only goes to 5000 m.
- The maximum error of 0.005 kts for current speed: Tentative "system" value is 0.03 kts.
- The unknown X, Y spacing if less than 600 n. mi: Tentative "system" DO spacing is about 600 n. mi.

Requirements not met and why:

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 10 Aug 78

Parameters / Characteristics		OCEANOGRAPHIC: Curr dir	Curr speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	METEOROLOGICAL: Air temp	Atmos elect	Atmos press	Wind	Wind direc	Precip rate	Avail air	Avail power
Geographic location		Deep Ocean 60°N to 60°S/N America Coast out to 400 n. mi																			
Vertical layer		Surface to 6000 m depth									Surface			Top of buoy mast to surface							
Range (5 yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42.0 o/oo	4500 to 5800 fps	5 to 40°C	0 to 10^4 psi	0 to 2.0 ly m	80 to 20 db	0 to 70% /m	0 to 100 ft	1 to 10 sec	0 to 360°	5 to 60°C	0 to 10 kv	400 to 1000 mb	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 o/oo	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	[illegible]	1°	[illegible]	[illegible]	[illegible]
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	~ 600 n. mi/100–150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob synch	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 86 REQUIREMENTS ONR, Woods Hole Oceanographic Institution – Research on Gulf Stream

Geographic location		Outside Gulf Stream Proper/Within Gulf Stream Proper – 35°N to 45°N and 50°W to 75°W																			
Vertical layer		Sfc to bottom	→	→		Sfc to bottom								Sfc						Sfc	Sfc
Range		0 to 360°	0.05 to 6 kts	30 to 37.5 o/oo		2 to 35°C								15 to 40°C						0 to 360°	0 to [illegible] kts
Maximum error		20°	0.4 kts	0.01 o/oo		0.05°C and 0.03°C below THCL								0.5°C						30°	[illegible]
Duration of ob		Inst	→	→		Inst								Inst						Short period avg. about [illegible] min	
Sampling Intensity	X, Y	60/10 n. mi	→	→		60/10 n. mi								100 n. mi						[illegible] n. mi	[illegible] n. mi
	Z	1 ob at 200 m in layer	(At least) →	→		1 ob at 600 m layer								N/A						N/A	N/A
	Time	24 hrs	→	→		24 hrs								24 hrs						24 hrs	24 hrs
Ob synch	X, Y	15 min	→	→		15 min								15 min						15 min	15 min
	Z	1 sec	→	→		3 sec								N/A						N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met.

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The X, Y spacing of 60/10 n. mi and 100 n. mi in DO. Tentative "system" initial spacing is 600 n. mi DO and 100–150 n. mi CNA.
- The 3 second Z synch. of ob. Tentative "system" allows 1 min.

Requirements not met and why

- Oxygen. Uncertainty about ob. from buoy unattended for long periods

*These are 1967 data requirements not refined

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen											
Geo location		Outside Gulf Stream proper/within Gulf Stream proper—35°N to 45°N and 50°W to 75°W											
Vertical layer		Sfc to bottom											
Range		2 to 8 ml/l											
Maximum error		0.2 ml/l											
Duration of ob		Inst.											
Sampling intensity	X, Y	60 / 10 n. mi											
	Z	1 ob. at 200 m in lyr											
	Time	24 hrs											
Ob. synch	X, Y	15 min											
	Z	30 sec											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo. location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X, Y												
	Z												
	Time												
Ob. synch.	X, Y												
	Z												

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp	W. press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S/N. American Coast out to 100 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 10 lx-m	-80 to -20 db	0 to 70% /m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 30°C	[illegible]	[illegible] in./hr	0 to 360°	[illegible]
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	[illegible] in./hr	2°	[illegible]
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	600 n. mi/100—150 n. mi																			
	Z	20 Std. LAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 87 REQUIREMENTS ONR, Nova University—Measure of Velocity and Mass Fields in Strong Currents

Geographic location		Major Currents of the World																			
Vertical layer		Any depth	→	—	—	→	→														
Range		0 to 360°	0 to 6 kts			2 to 30°C	0 to 5600 psi														
Maximum error		10°	3%			0.1°C	0.5%														
Duration of ob.		1 month avg.	→	—	—	→	→														
Sampling Intensity	X, Y	1/10 of max stream width		—	—	→	→														
	Z	20 m	20 m			20 m	20 m														
	Time	1 to 3 days	→	—	—	→	→														
Ob. synch	X, Y	1 hr	1 hr			1 hr	1 hr														
	Z	1 hr	1 hr			1 hr	1 hr														

3. RESULTS OF ASSESSMENT

Requirements fully met.

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The duration of ob. if longer than 10 min. Tentative "system" is 10 min or less,
- The fine scale X, Y spacing. Tentative "system" initial spacing of 600/100—150 n. mi will be greater especially in DO,
- The 20 in Z sampling intensity. Tentative "system" uses 20 LAPSO levels to 5000 m which will be too gross in depths greater than 500 m

Requirements not met and why

- Electrical Volume Conductivity. Uncertainty about ob. from buoy unattended for long periods

*These are 1967 data requirements not refined.

'GREY AREA' PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug. 68

Parameter		Elec. Vol. Conductivity												
Geo. location		Major Curr. of the world												
Vertical layer		Any depth												
Range		45 to 60 mmHo/cm												
Maximum error		0.02 mmHo/cm												
Duration of ob.		1 mo. avg.												
Sampling intensity	X, Y	1/10 of max stream width												
	Z	20 m												
	Time	1 to 3 days												
Ob. synch	X, Y	1 hr												
	Z	1 hr												

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter														
Geo. location														
Vertical layer														
Range														
Maximum error														
Duration of ob.														
Sampling intensity	X, Y													
	Z													
	Time													
Ob. synch.	X, Y													
	Z													

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVE PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per	Dir	Air temp.	Atmos. elect.	Atmos. press.	Dew point	Inso-lation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean 60°N to 60°S/N Americas Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42.0/00	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	0-12 in. hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in. hr	2°	0.5 kts or 1%
Duration of ob		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	> 500 n. mi/100–150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/1 hrs																			
Ob. synch.	X, Y (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 88 REQUIREMENTS Naval Undersea Warfare Center—Research on Underwater Sound Propagation Patterns

Geographic location		San Diego to 300 Miles out in a Circle																			
Vertical layer		Sfc - bottom max 72[illegible] m			Sfc to bottom max 700 m			Bottom max 700 m		Sfc									Sfc to 20 ft	Sfc to 20 ft
Range		0 to 360°	0 to 5 kts			4 to 25°C		Needs elaboration		0 to 10 ft									0 to 360°	0 to 20 kts
Maximum error		20°	0.2 kts sfc 1 kts bottom			0.2°C		A/R		10%									2°	0.5 kts or 1%
Duration of ob		Inst	Inst			Inst		1 min avg.		1 min avg									5-10 min	5-10 min
Sampling Intensity	X, Y	10 n. mi or just 1 site	←			←		→		→									—	—
	Z	Sfc - bottom	Sfc - bottom			Varies ? to 70 m (c. 50 ly/m)		Bottom only		N/A									Not stated	Not stated
	Time	4 hrs	4 hrs			4 hrs		4 hrs		4 hrs									4 hrs	4 hrs
Ob. synch	X, Y	N/A	N/A			N/A		N/A		N/A									N/A	N/A
	Z	10 min	10 min			10 min		N/A		N/A									10 min	10 min

3 RESULTS OF ASSESSMENT

Requirements fully met.

Requirements partially met and why All requirements listed in 2 above would be met with the exception of

- The Z spacing of 7 to 70 m (total 50 levels to 700 m). Tentative "system" has only 12 levels to 700 m.

Requirements not met and why None of the above measurements will be of value unless made in conjunction with rather involved acoustic measurements at the same station using bottom-mounted hydrophone arrays and elaborate signal-processing equipment. It is doubtful that any sensible arrangement could be made to satisfy their requirements with a general purpose buoy

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '88

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr. speed	Salinity	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Trans-parency	Wave measurements* Ht.	Per	Dir	Air temp.	Atmos elect	Atmos press	Dew point	Inso-lation	Precip rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5600 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-60 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)					2 levels				Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 89A REQUIREMENTS USN, NAVAIRSYSCOM (Air-5401)—Develop Analysis/Prediction Techniques to Support NWS (Synoptic)

Geographic location		CNA out to 150 n. mi, Gulf of Mexico, 0 to 30°N + 150°W to 120°E, 0 to 30°N + 35°W to NA, 30°N to 45°N 150°W to 40°E (+ Antarctic)																			
Vertical layer		Sfc to 500 m	Sfc to 500 m			Sfc to 500 m					Sfc	→	→	Sfc to 6 m		Sfc	Sfc to 4 m	Sfc		Low lvl abv. sfc	
Range		0 to 360°	0.05 to 5 kts			-2 to 35°C					0 to 40 ft	6 to 22 sec	0 to 360°	-5 to 40°C		900 to 1060 mb	-5 to 40°C	0.015 to 2.25 ly/m		0 to 360°	0 to 100 kts
Maximum error		10°	0.5%			0.5°C					0.2 ft or 10%	0.1 sec or 1%	10°	0.5°C		1 mb	0.5°C	1.5%		7°	0.5 kts or 3%
Duration of ob.		Inst	Inst			Inst					Inst	→	→	→		Inst	→	→		Inst, 10 min if > 20 kts	
Sampling Intensity	X, Y	200 to 500 n. mi				200 to 500 n. mi					200 to 500 n. mi	→	→	→		200 to 500 n. mi	→	→		200 to 500 n. mi	
	Z	IAPSO std levels				IAPSO std lvls					N/A	→	→	6 m		N/A	→	→		N/A	N/A
	Time	12 hrs	12 hrs			12 hrs					12 hrs	→	→	→		12 hrs	→	→		12 hrs	12 hrs
Ob. synch	X, Y	30 min	30 min			30 min					30 min	→	→	→		30 min	→	→		30 min	30 min
	Z	30 sec	30 sec			30 sec					N/A	→	→	5 sec		N/A	N/A	N/A		N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The maximum allowable error of 0.5% for current speed: Tentative "system" value is the larger of 0.03 kts or 1%.
- The 30 sec Z synch. of ob: Tentative "system" allows up to 1 min.
- The X, Y spacing of 200—500 n. mi in the DO: Tentative "system" spacing is about 600 n. mi.

Requirements not met and why

- All requirements in Antarctica 60°S to South Pole: Tentative "system" does not include this area.
- Total Radiation in and out: Uncertainty about ob. from NDBS type buoy

REVISED AMO # 89A REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 26 Aug. 68

Parameter		Total radiation out	Total radiation in										
Geo location		Same as pg. 1											
Vertical layer		Near sfc	Near sfc										
Range		0.015 to 2.25 ly/m	0.015 to 2.25 ly/m										
Maximum error		1.5%	1.5%										
Duration of ob		Inst	Inst										
Sampling intensity	X Y	200 to 500 n. mi	200 to 500 n. mi										
	Z	N/A	N/A										
	Time	12 hrs	12 hrs										
Ob synch	X Y	30 mins	30 min										
	Z	N/A	N/A										

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X Y												
	Z												
	Time												
Ob synch	X Y												
	Z												

Remarks

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

Revised 20 Aug '68

1. TENTATIVELY PROPOSED MINIMUM SENSING CAPABILITIES

Parameter / Characteristics	OCEANOGRAPHIC											METEOROLOGICAL							
	Curr dir	Curr speed	Salinity	Sound speed	Water temp	Water press depth	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Cocos (10°N to 60°N) / N American Coast out to 450 n mi									Surface			Top of buoy mast to surface							
Vertical layer	Surface to 5000 m depth																			
Range (5 yr MOA)	0 to 360°	0 to 10 kts	0 to 42 ‰	4500 to 1600 fps	1 to 40°C	0 to 5000 psi	0 to 1 ly m	30 to 20 db	0 to 70% m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1000 mb	25 to 40°C	0.01 to 2.0 ly m	0.12 in. hr	0 to 360°	0 to 160 kts
Max error (5 yr MOA)	5°	0.05 kts or 1%	0.01 ‰	5 fps	0.01°C	0.1%		2 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in. hr	5°	1 kts or 1%
Duration of obs	Inst or short period avg - Representative																			
Sampling Intensity X, Y	< 600 n mi / 100-250 n mi																			
Sampling Intensity Z	20 std IAPSO levels / near bottom					2 levels				Surface										
Sampling Intensity Time	6 hrs / 3 hrs																			
Obs. speed X, Y, (Z)	10 min, (1 min)																			

* Includes Measurements of Swells

2. SPECIFIED AND/OR REQUIREMENTS (FROM NAVAIRSYSCOM Air Sta - Develop Anal/Pred Techniques to Support NWS Meso scale)

Geographic location	CONUS out to 150 n mi / Gulf of Mexico / 0 to 20°N - 150°W to 120°E / 0 to 10°N - 35°W to N.A. / 30°N to 45°N - 15°W to 40°E / Antarctic																			
Vertical layer	Sfc to 15.0 m	Sfc to 15.0 m			Sfc to 15.0 m															
Range	0 to 360°	0 to 20 kts			0 to 38 ‰															
Maximum error	1°	0.5%			0.5%															
Duration of obs	Inst	Inst			Inst															
Sampling Intensity X, Y	IAPSO std levels 20 to 100 n mi				IAPSO std levels 20 to 100 n mi															
Sampling Intensity Z																				
Sampling Intensity Time	12 hrs	12 hrs			12 hrs															
Obs. speed X, Y	15 min	15 min			15 min															
Obs. speed Z	10 sec	30 sec			30 sec															

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed in above. In the exception of

- The X, Y spacing of 100 n mi in the Gulf. Tentative "goals" spacing is about 50 n mi
- The maximum allowable error of 0.1 for current speed. Tentative "goal" value is the larger of 0.03 kts or 1%
- The 30 sec Z sample of obs. Tentative "goal" allows a 1 min

Requirements not met and why

- All requirements in Antarctic 60°S to South Pole. Tentat. [illegible] no data this area

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED WIND SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics	OCEANOGRAPHIC												METEOROLOGICAL							
	Curr dir	Curr speed	Subsurf	Sound speed	Water temp	W press (depth)	Ambient light	Ambient noise	Trans parency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location	Deep Ocean 164°W to 64°W, Americas Coast out to 400 n mi												Top of buoy mast to surface							
Vertical layer	Surface to 100' in depth									Surface										
Range (3 yr RMS)	0 to 360°	0.06 to 10 kts	0 to 42%	4850 to 5806 fps	5 to 40°C	0 to 100 psi	0 to 2.0 ly/m	80 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-5 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0.12 in./hr	0 to 360°	0 to 160 kts
Max error (3 yr RMS)	2°	0.01 kts or 3%	0.01 kts	1 fps	0.0°C	0.1%	1%	3 db	3%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	5 kts or 1%
Duration of ob	Inst or short period avg Representative																			
Sampling Intensity X, Y	5 km/100-150 n mi																			
Sampling Intensity Z	30 fms (AFBC) levels (near bottom)						2 levels			Surface										
Sampling Intensity Time	6 hrs/3 hrs																			
Ob events X Y Z	10 min, (1 min)																			

*Tentative Measurements of Swells

2. REFINED AMSS & SSC REQUIREMENTS (CSN, NAV, AIRWAY, COM, Air Sea) Develop Anal Pred Techniques to Support NWS (Micro(Meso)Scale)

Parameters / Characteristics																				
Geographic location	CONUS out to 150 n mi (half of Mex) 0 to 30°N & 150°W to 120°E 0 to 30°N & 35°W to NA, 30°N to 4°N & 15°W to 40°E, Antarctic																			
Vertical layer	Sfc to 150 m				Sfc to 150 m					Sfc			Sfc to 6 m		Sfc	Sfc to 4 m	Sfc		Low lvl Sfc	
Range	0 to 360°	0 to 5 kts			2 to 35°C					0 to 40 ft	6 to 22 sec	0 to 360°	-5 to 40°C		900 to 1050 mb	-5 to 40°C	0.01 to 2.25 ly/m		0 to 360°	0 to 100 kts
Maximum error	10°	0.5%			0.5°C					0.2 ft or 10%	0.1 sec or 1%	10°	0.5°C		1 mb		1%			0 kts or 2
Duration of ob	Inst	Inst			Inst					Inst					Inst				Inst 10 min	
Sampling Intensity X, Y	0.1 n mi	0.1 n mi			0.1 n mi		(At spec locations in areas stated)			30 to 60 n mi					30 to 60 n mi				30 to 60 n mi	
Sampling Intensity Z	(AFBC) levels				(AFBC) Std levels					N/A			6 m		N/A				N/A	
Sampling Intensity Time	3 hrs	2 hrs			2 hrs					3 hrs					3 hrs				3 hrs	
Ob events X, Y	30 sec	30 sec			30 sec					30 sec					30 sec				30 sec	
Ob events Z	30 sec	30 sec			30 sec					N/A			5 sec		N/A				N/A	

3. EVALUATION OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The micro-scale X, Y spacing (tentative "system" values are much grosser
- The 2 and 3 hr frequency of ob (in de[illegible] (tentative "system" also is 6 hr)
- The max allowable error of 0.5% for [illegible] (tentative "system" value is the larger of 0.03 kts or 1%
- The 30 sec X, Y and Z march of ob (tentative "syst[illegible] have up to 10 min and 1 min

Requirements not met and why

- All requirements in Antarctica 40°E to 8 [illegible] (tentative "system" does not include this area
- Total radiation in and out (uncertainty about ob from NIMBUS type sens

GREY AREA PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 6[illegible]

Parameter		Total radiation out	Total radiation in										
Geo location		Same as pg 1											
Vertical layer		Near sfc	Near sfc										
Range		0.015 to 2.25 ly/m	0.015 to 2.25 ly/m										
Maximum error		1.5%	1.5%										
Duration of ob		Inst	Inst										
Sampling intensity	X, Y	30 to 60 n mi	30 to 60 n mi										
	Z	N/A	N/A										
	Time	3 hrs	3 hrs										
Ob synch	X, Y	30 sec	30 sec										
	Z	N/A	N/A										

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X, Y												
	Z												
	Time												
Ob synch	X, Y												
	Z												

Remarks

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '88

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 o/oo	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	80 to 20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 ly/m	0.12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 o/oo	1 fps	0.01°C	0.1%	1%	3 db	2%	0.3 or 10%	0.1 sec or 1%	5°	0.1°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 2%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/2 hrs																			
Ob. synch	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2 REFINED AMO # 92 REQUIREMENTS NSF, MIT—General Circulation of the Atmosphere and Oceans

Geographic location		World Oceans																			
Vertical layer		Sfc to 400 m	→	→		Sfc to 400 m	Bottom														
Range		0 to 360°	0 to 8 kts	30 to 38 o/oo		-2 to 30°C	0 to 8500 psi														
Maximum error		To be determined	→	- - -		→	→														
Duration of ob		24 hrs	→	→		24 hrs	24 hrs														
Sampling Intensity	X, Y	Varies ~ 1200 ob. sites over oceans	→	- - -		→	→														
	Z	To be determined	→	- - -		→	→														
	Time	2 days	→	→		2 days	2 days														
Ob. synch	X, Y	2 hrs	→	→		2 hrs	2 hrs														
	Z	2 hrs	→	→		2 hrs	2 hrs														

RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The 24 hr duration of ob: Tentative "system" has duration of 6 min or less.
- The to be determined requirements: Tentative "system" may not satisfy some of these requirements when they are determined.

Requirements not met and why:

- Rawinsonde Data, Flux-mass, Heat and Momentum: Considered beyond 5-yr buoy SOA.

*These are 1987 data requirements not refined.

REFINED AMC 4 2 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X Y												
	Z												
	Time												
Ob synch	X, Y												
	Z												

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter		(Rawin onde Data) Air Temp.	R. H.	At. Press.	Wind Dir.	Wind Speed	Flux-Mass	Flux-Heat	Flux-Momentum				
Geo location		World Oceans											
Vertical layer		Sfc to 10 mb					Sfc to 400 m						
Range		-100 to 60°C	0 to 100%	10 to 1050 mb	0 to 360°	0 to 300 kts	To be determined						
Maximum error		USWB Standard					To be determined						
Duration of ob.		15 min					24 hrs						
Sampling intensity	X, Y	300 n. mi					Varies ~ 1200 ob sites over ocean						
	Z	Mandatory levels					To be determined						
	Time	12 hrs					24 hrs						
Ob synch.	X, Y	1 hr					2 hrs						
	Z	1 hr					2 hrs						

Remarks

Page 2

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '6

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Amb. sml noise	Trans-parency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10^4 psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 40°C	0 to 10 kv	600 to 1090 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 1%
Duration of ob.		Inst. or Short period avg (Representative)																			
Sampling intensity	X, Y	≤ 600 n. mi/100—150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AMC # 93 REQUIREMENTS NSF, MIT—Research on Internal Gravity Waves

Geographic location		Tropical, Subtropical and Mid-latitudes of World Oceans																			
Vertical layer		Sfc to bottom	→	→		Sfc to bottom	Bottom														
Range		0 to 360°	0 to 8 kts	30 to 38 0/00		-2 to 30°C	0 to 8500 psi														
Maximum error		10°	0.02 kts	0.003 0/00		0.02°C	0.15 psi														
Duration of ob.		10 sec	→	→		10 sec	10 sec + 20 min avg.														
Sampling intensity	X, Y	4 buoys in 4 min squares scattered throughout the area of interest																			
	Z	20 levels	→	→		20 levels	N/A														
	Time	24 hrs	→	→		24 hrs	24 hrs														
Ob. synch	X, Y	5 min	→	→		5 min	5 min														
	Z	10 sec	→	→		10 sec	10 sec														

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why All requirements listed would be met with the exception of

- The maximum error for Salinity and W. Press: Tentative "system" has more realistic operational values of 0.01 0/00 and 0.1%.
- The 20 min average duration of ob. for W. Press: Tentative "system" is 10 min or less.
- The 5 min (X, Y) and 10 sec (Z) synch. of ob: Tentative "system" allows 10 min (X, Y) and 1 min (Z).
- The Fine scale X, Y spacing Tentative "system" initial spacing is 600 n. mi in DO and 100—150 n. mi in CNA.
- The vertical layer if bottom is below 5000 m Tentative "system" only goes to 5000 m.

Requirements not met and why

*These are 196. data requirements not refined

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1 TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Per	Dir	Air temp	Atmos elect	Atmos. press	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S/N. American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 180 kts
Max error (5-yr SOA)		5°	0.03 kts or .5%	0.01 0/00	1 fps	0.01°C	0.1%	1.3	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 5%
Duration of ob.		Inst. or Short period avg. (Representative)																			
Sampling intensity	X, Y	≤ 600 n. mi/100-150 n. mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob synch	X, Y, (Z)	10 min, (1 min)																			

*Include Measurements of Swells

2 REFINED AMO # 94 REQUIREMENTS NET, MIT – Research on Rossby Waves

Geographic location		Mid-latitudes of World Oceans																			
Vertical layer		Sfc to bottom	→	→		Sfc to bottom	Bottom														
Range		0 to 360°	0 to 8 kts	30 to 38 0/00		- 2 to 30°C	0 to 8500 psi														
Maximum error		10°	0.02 kts	0.003 0/00		0.02°C	0.03 psi														
Duration of ob.		5 min	→	→		5 min	5 min - 20 min avg.														
Sampling intensity	X, Y	4 - square each 600	→	→		→	→														
	Z	20 grid intervals	→	→		20 lvls	Bottom														
	Time	24 hrs	→	→		24 hrs	24 hrs														
Ob synch.	X, Y	5 min	→	→		5 min	5 min														
	Z	10 sec	→	→		10 sec	10 sec														

3 RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed would be met with the exception of

- The maximum error for Salinity and W. Press: Tentative "system" has more realistic operational values of 0.01 0/00 and 0.1%.
- The 20 min average duration of ob. for W. Press: Tentative "system" is 10 min or less.
- The 5 min (X, Y) and 10 sec (Z) synch. of ob: Tentative "system" allows 10 min (X, Y) and 1 min (Z).
- The X, Y sampling intensity: Tentative "system" has one buoy each 600 n. mi.
- The vertical layer if bottom is below 5000 m: Tentative "system" only goes to 5000 m.

Requirements not met and why

*These are 1967 data requirements, not refined.

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Salinity	Sound speed	Water temp.	Water pres (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht.	Wave measurements* Per	Wave measurements* Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (80°N to 40°S) / N American Coast out to 400 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SGA)		0 to 360°	0.06 to 10 kts	0 to 42 0/00	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	-80 to -20 db	0 to 70%/m	0 to 100 ft	1 to 40 sec	0 to 360°	-25 to 60°C	0 to 10 kv	800 to 1099 mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SGA)		5°	0.03 kts or 1%	0.01 0/00	1 fps	0.01°C	0.1%	1%	3 db	3%	0.2 ft or 10%	0.1 sec or 1%	5°	0.1°C	01 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob		Inst or Short period avg. (Representative)																			
Sampling Intensity	X, Y	≤ 600 m. sel/100—150 m. sel																			
	Z	20 Std. IAPSO levels (near bottom)					2 levels				Surface										
	Time	6 hrs/3 hrs																			
Ob. synch	X, Y, (Z)	1 min, (1 min)																			

*Includes Measurements of P wells

2. REFINED AMO # 97 REQUIREMENTS Naval Civil Engineering Laboratory—Site Survey for Manned Underwater Station

Geographic location		Vicinity of Santa Barbara Channel Islands, California																			
Vertical layer			Sfc to bottom	Sfc to bottom		Sfc to bottom														Sfc	Sfc
Range			0 to 6 kts	33 to 35 0/00		0 to 20°C														0 to 360°	0 to 50 kts
Maximum error			0.1 kts	0.01 0/00		0.2°C														2°	1 kt
Duration of ob			≤ 10 min	≤ 10 min		≤ 10 min														≤ 10 min	≤ 10 min
Sampling intensity	X, Y		Not stated	Not stated		Not stated														Not stated	Not stated
	Z		10 levels	10 levels		10 levels														N/A	N/A
	Time		6 hrs	3 hrs		6 hrs														6 hrs	6 hrs
Ob synch	X, Y		N/A	N/A		N/A														N/A	N/A
	Z		N/A	N/A		N/A														N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met:

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of

- The "not stated" X, Y spacing: Tentative "system" may be more gross.
- The 10 levels for Z sampling intensity: Tentative "system" would have less than 10 levels in most of the area of interest.
- Sea State: Some measure of sea state can be approximated from wave measurements whether the coding will be exactly what is wanted must be resolved.

Requirements not met and why

*These are 1967 data requirements not refined

REFINED AMO # 97 REQUIREMENTS (Continued)

"GREY AREA" PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Sea State											
Geo location		Vicinity of Santa Barbara Channel Islands Calif											
Vertical layer		Sfc											
Range		Code 0 to 6											
Maximum error		9 N/A											
Duration of ob		≤ 10 min											
Sampling intensity	X, Y	Not stated											
	Z	N/A											
	Time	6 hrs											
Ob synch	X, Y	N/A											
	Z	N/A											

Remarks: Original Sea State measurement is a manual operation which can be approximated by a combination of "system" measurements

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob.													
Sampling intensity	X, Y												
	Z												
	Time												
Ob synch	X, Y												
	Z												

Remarks

ASSESSMENT SHEET FOR REFINED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED NDBS SENSING CAPABILITIES

Revised 20 Aug '68

Characteristics \ Parameters		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr. dir.	Curr. speed	Salinity	Sound speed	Water temp.	W. press (depth)	Ambient light	Ambient noise	Transparency	Wave measurements* Ht	Per	Dir	Air temp	Atmos.	Atmos. press	Dew point	Insolation	Precip. rate	Wind dir.	Wind speed
Geographic location		Deep Ocean (60°N to 60°S) N American Coast out to 100 n. mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5-yr SOA)		0 to 360°	0.05 to 10 kts	0 to 42 ‰	4500 to 5800 fps	-5 to 40°C	0 to 10⁴ psi	0 to 2.0 ly/m	80 to -20 db	0 to 70% /m	0 to 150 ft	0 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 10[illegible] mb	-25 to 40°C	0.01 to 2.0 ly/m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5-yr SOA)		5°	0.03 kts or 1%	0.01 ‰	1 fps	0.01°C	0.1%	5%	3 db	2%	0.2 ft or 0.1%	0.1 sec or 1%	5°	0.1°C	.01 kv	0.1 mb	0.2°C	1%	.01 in./hr	2°	0.5 kts or 3%
Duration of ob.		Inst. or Short period avg (Representative)																			
Sampling Intensity	X, Y	≤ 600 n. mi/100-150 n. mi.																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob. synch.	X, Y, (Z)	10 min. (1 min)																			

*Includes Measurements of Swells

2. REFINED AMO # 98 REQUIREMENTS BCF, Honolulu – Basic Water Mass Study

Geographic location		Pacific Ocean 0°–35°N and 130°W–180°																			
Vertical layer		Sfc to 1500 m	→	→		Sfc to 1500 m		Sfc to 1500 m		Sfc to 1500 m											
Range		0 to 360°	0.1 to 3 kts	33 to 36 ‰		0 to 30°C		0 to 2.0 ly/m		0 to 70% /m											
Maximum error		5°	0.03 kts or 1%	0.01 ‰		0.01°C		1%		2%											
Duration of ob.		≤ 10 min	→	→		≤ 10 min		≤ 10 min		≤ 10 min											
Sampling Intensity	X, Y	60 n. mi in major currents; 500 to 800 n. mi elsewhere	→	→		→		→		→											
	Z	IAPSO levels but denser in THCL	→	→		→		→		→											
	Time	24 hrs	→	→		24 hrs		24 hrs		24 hrs											
Ob. synch.	X, Y	10 min	→	→		10 min		10 min		10 min											
	Z	1 min	→	→		1 min		1 min		1 min											

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why All requirements listed in 2 above would be met with the exception of

- The 60 n. mi spacing in major currents. Tentative "system" has spacing of about 600 n. mi.
- The denser Z spacing in thermocline. Tentative "system" has only IAPSO levels.

Requirements not met and why

- Oxygen. Uncertainty about ob. from buoys unattended for long periods.

REFINED AMG # 9" REQUIREMENTS (Continued)

GREY AREA PARAMETERS NOW IN QUESTION FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Revised 20 Aug 68

Parameter		Oxygen											
Geo location		Same as page 1											
Vertical layer		Sfc to 1500 m											
Range		0 to 6 ml/l											
Maximum error		0.1 ml/l											
Duration of ob		< 10 min											
Sampling intensity	X Y	60 n mi in currents 100 to 200 n mi elsewhere											
	Z	IAPSO levels but denser in thl											
	Time	1 per wk											
Ob events	X Y	10 min											
	Z	1 min											

Remarks

PARAMETERS CONSIDERED BEYOND THE 5-YR STATE OF THE ART FOR THE TENTATIVELY PROPOSED DATA BUOY SYSTEM

Parameter													
Geo location													
Vertical layer													
Range													
Maximum error													
Duration of ob													
Sampling intensity	X Y												
	Z												
	Time												
Ob events	X Y												
	Z												

Remarks

Page

ASSESSMENT [illegible] FOR [illegible]ED DATA REQUIREMENTS

1. TENTATIVELY PROPOSED MDHS SENSING CAPABILITIES

Revised 20 Aug '68

Parameters / Characteristics		OCEANOGRAPHIC												METEOROLOGICAL							
		Curr dir	Curr speed	Ballast	Wave speed	Water temp	W press (depth)	Ambient light	Ambient noise	Trans parency	Wave measurements* Ht	Per	Dir	Air temp	Atmos elect	Atmos press	Dew point	Insolation	Precip rate	Wind dir	Wind speed
Geographic location		Deep Ocean (60°N to 40°S) W American Coast out [illegible] 400 n mi																			
Vertical layer		Surface to 5000 m depth									Surface			Top of buoy mast to surface							
Range (5 yr SOA)		0 to 360°	0.06 to 10 kts	0 to 42 [illegible]	4500 to 5000 fps	[illegible]	0 to 10^4 psi	[illegible] to 2.0 by m	80 to 20 db	0 to 100% [illegible]	0 to 100 ft	1 to 40 sec	0 to 360°	25 to 60°C	0 to 10 kv	800 to 1099 mb	25 to 40°C	0.01 to 2.0 by m	0-12 in./hr	0 to 360°	0 to 160 kts
Max error (5 yr SOA)		5°	0.03 kts or 1%	0.01 [illegible]	1 fps	[illegible]	0.1%	1%	3 db	2%	0.2 ft or 10%	0.1 sec or 1%	5°	0.2°C	0.1 kv	0.1 mb	0.2°C	1%	0.01 in./hr	2°	0.5 kts or 3%
Duration of ob		Inst or Short period avg (Representative)																			
Sampling intensity	X, Y	[illegible] 640 n mi/100-150 n mi																			
	Z	20 Std. IAPSO levels (+ near bottom)						2 levels			Surface										
	Time	6 hrs/3 hrs																			
Ob synch	X, Y, (Z)	10 min, (1 min)																			

*Includes Measurements of Swells

2. REFINED AND [illegible] REQUIREMENTS BCF, Alaska – Research on Environment of Fish in Alaskan Waters

Geographic location		East Continental Shelf in Gulf of Alaska - Bering Sea and DO N of 50°N and E of 165°W																			
Vertical layer		Sfc to unk				Sfc to unk								Sfc		Sfc				Sfc	Sfc
Range		Not stated				Not stated								Not stated		Not stated				Not stated	Not stated
Maximum error		Not stated				Not stated								Not stated		Not stated				Not stated	Not stated
Duration of ob		Not stated				Not stated								Not stated		Not stated				Not stated	Not stated
Sampling intensity	X, Y	Varies from a few miles in East [illegible] 50 to 300 n mi in coastal waters, to 300 to 1000 n mi in the deep ocean (see Map for exact locations)																			
	Z	0, 50, [illegible] 200, 300 m												N/A		N/A				N/A	N/A
	Time	Not stated												Not stated		Not stated				Not stated	Not stated
Ob synch	X, Y	Not stated				Not stated								Not stated		Not stated				Not stated	Not stated
	Z	Not stated				Not stated								N/A		N/A				N/A	N/A

3. RESULTS OF ASSESSMENT

Requirements fully met

Requirements partially met and why: All requirements listed in 2 above would be met with the exception of
* The "not stated" requirements. Tentative "system" may not satisfy some of these requirements if they are more stringent than "system"

Requirements not met and why

All requirements in estuaries and near shore waters (within [illegible] n mi of shore). Tentative "system" locations start about 25 n mi off the coast

APPENDIX V

TENTATIVE APPROACH FOR THE ESTIMATION OF RELATIVE VALUES OF OPERATIONAL PARAMETERS AND LAYERS

APPENDIX V. TENTATIVE APPROACH FOR THE ESTIMATION OF RELATIVE VALUES OF OPERATIONAL PARAMETERS AND LAYERS

Up to now a baseline set of environmental parameters has been established for the National Data Buoy Systems by a process of interviewing user agencies, collating the results and determining the degree of commonality and feasibility for collection by data buoys. These agency data requirements, although further refined, have been determined only on a "YES-NO" basis and no attempt has been made to rank parameters by their relative value to the agency in the performance of its various missions. In order that the National Data Buoy Systems development planning can be based on as logical a foundation as possible and to insure that the resulting buoy systems are responsive to the nation's important data requirements in a cost-effective way, it is now necessary to obtain users' estimates of relative values of the various requested parameters.

Some parameters have greater "worth" than others, either because more agencies need them, or they are more essential to satisfying mission requirements. A properly responsive data collecting system should satisfy these requirements to a high degree. Whether other less important parameters should be collected can then be decided on the basis of their incremental worth and the incremental cost of collecting them. Unfortunately, no convenient analytical means exists for determining the worth on a purely objective basis, at least within the time frame involved. The approach to be used, then, will be to take advantage of expert judgment expressed in the form of subjective evaluations.

By estimating the relative values of marine environmental parameters, the users will help establish those parameters which make up the essential minimum set that must be gathered by some means and must be considered in the hardware development plans for the initial buoy systems. This procedure will also help describe a logical path for development plans beyond the initial systems to meet the longer range, less critical requirements.

In order to make this initial attempt at ranking parameters meaningful, it must be kept comparatively simple and it must be consistent from agency to agency.

Accordingly, the following assumptions and ground rules should be followed by the estimators:

1. Each agency will make two ratings of the parameters. The first rating will be for all categories of oceanic missions, while the second rating will be for atmospheric missions. All parameters will be rated for each of the appropriate layers by each of the categories of missions.

2. The parameter characteristic requirements (accuracy, spatial distribution, etc.) are assumed to be met by the proposed systems.

3. Parameters should be rated without regard to the platform to be used to collect the data.

For the evaluation, a list of marine environmental parameters has been developed from a refinement of agency requirements and attached to this cover sheet for assignment of relative values. A system has been devised by which quantitative values can be assigned to four subjective criteria in which a parameter can be placed based on its relative importance in fulfilling an operational need. Although many parameters may be absolutely necessary to satisfy a mission or important to satisfy a mission, they may not have the same value relative to each other. Therefore, each of the two most important categories have been broken down into two relative values each. It is necessary that the parameters be carefully weighed in order to make an evaluation of their value meaningful. The four criteria, with their respective values are:

Value(s)		Criteria
5,4	-	Must have to satisfy missions
3,2	-	Important to satisfy missions
1	-	Useful to satisfy missions
0	-	Of no value to satisfy missions

Blank spaces are provided at the bottom of each list for including any parameters that are necessary to meet oceanic or atmospheric missions that were omitted in this

listing. Recognizing that the relative value of a parameter may change at different levels, the attached list has been broken down into seven vertical layers with approximate limits as follows:

Upper air:	- 1.	100,000 to 30,000 feet
	2.	30,000 to 45 feet
Surface: air water	- 3.	45 feet to 0
	4.	0 to 10 m
Sub surface:	- 5.	10 m to 500 m
	6.	500 m to 5000 m
	7.	At or near bottom, regardless of depth.

Each agency is requested to make separate oceanic and atmospheric mission value ratings of the seven listed layers in a manner similar to that for the parameters. This rating will be done on the separate table at the bottom of the rating sheet.

Any questions that arise concerning the response to this form should be made by phone to Commander MORRILL of the Coast Guard Project Management Office.

This represents the first attempt at estimating the relative values of operational parameters within vertical layers. Future refinements may still be required to establish the total set of parameters within layers to be measured by the initial buoy systems. Various negotiations with agency representatives may still be required once the completed forms have been analyzed. It is recognized that there are limitations to this approach but the results should provide a guide for initial data buoy system development efforts while the federal government continues to refine specifics on data use and user benefits.

It is requested that the two completed forms be returned by 16 August 1968. Please send the completed responses to:

CDR P.A. MORRILL
Chief, Requirements Division
National Data Buoy Systems Project
Management Office, Suite 400
733 15th Street N.W.
Washington, D.C. 20005
Tel. No. 964-2909

Parameter	Layer: 100,000 to 30,000 feet	Layer: 30,000 to 45 feet	Layer: 45 to 0 feet	Layer: 0 to 10 meters
Ozone Content				
Cosmic Radiation				
Cloud Tops				
Cloud Bases				
Cloud Amount				
Wind Speed				
Wind Direction				
Air Temperature				
Height				
Atmos. Pressure				
Dew Point, Humidity				
Atmos. Electricity				
Insolation				
Precipitation				
Visibility				
Magnetic Field Declination				
Magnetic Field Inclination				
Magnetic Field Intensity				
Gravity				
Wave Period				
Wave Direction				
Wave Height				
Tidal Fluctuation				

Parameter	Layer: 0 to 10 meters	Layer: 10 to 500 meters	Layer: 500 to 5000 meters	Layer: At or near the bottom
Ambient Light				
Ambient Noise				
Current Direction				
Current Speed				
Salinity				
Sound Speed				
Transparency				
Water Temperature				
Propagation Loss				
Depth				
Water Pressure				
Oxygen				
Carbon Dioxide				
Phosphates				
Nitrates				
pH				
Nutrients				
Plankton				
Chlorophyl				
Biological Growth				
Photos of Fish				
Vertical Current				
Bottom Composition				
Photos of Bottom				
Bathymetry				
Sediment Deposit				

Layer	Value
100,000 to 30,000 feet	
30,000 to 45 feet	
45 to 0 feet	
0 to 10 meters	
10 to 500 meters	
500 to 5000 meters	
At or near the bottom	

Criteria for Estimating Relative Values

Value	Criteria
5, 4	Must have to satisfy missions
3, 2	Important to satisfy missions
1	Useful to satisfy missions
0	Of no value to satisfy missions

DOCUMENT CONTROL DATA - R&D

UNITED STATES COAST GUARD

APPLICABILITY OF NATIONAL DATA BUOY SYSTEMS TO REFINED NATIONAL REQUIREMENTS FOR MARINE METEOROLOGICAL AND OCEANOGRAPHIC DATA

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

FINAL REPORT; TWO VOLUMES

5. AUTHOR(S) (First name, middle initial, last name)

THE TRAVELERS RESEARCH CENTER, INC.

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1968	VOL #1-154/VOL# 2-143	UNKNOWN

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
DOT-CG-82504-A	VOL #1 7493-332a VOL #2 7493-332b
b. PROJECT NO.	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

10. DISTRIBUTION STATEMENT

This document has been approved for public release and sale; its distribution is unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	UNITED STATES COAST GUARD

13. ABSTRACT

Volume I - This report documents the 1968 refinement of requirements for marine meteorological and oceanographic data--initially compiled during the 1967 Study of the Feasibility of National Data Buoy Systems--and shows the applicability of certain postulated National Data Buoy Systems sensing characteristics to a subset of the refined data requirements. Included in the refined requirements to support national operational and research activities are physical, biological, chemical, geological and radiological parameters which are to be measured throughout the world's oceans from the ocean bottom to 100,000 feet in the atmosphere. The data requirements are projected from the present to as far as 15 years into the future.

The study presents a subset of 20 parameters suggested as being representative of the basic sensing characteristics of a future deep ocean or coastal North American National Data Buoy Systems. Estimates of relative values of parameters and observing layers are also included in this study as part of the documentation of the ongoing effort to provide a base for the assessment of hypothetical technically feasible sensing characteristics within the 5 year state-of-the-art. ( )

Volume II - This report contains five supporting Appendixes for Volume I.

DD FORM 1473 (PAGE 1)

S/N 0101-807-6801

UNCLASSIFIED

Security Classification